REPORT RESUMES

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THE TEACHER, PROGRAMED MATERIALS, AND INSTRUCTIONAL
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TESTS ON ALGEBRA WERE PREPARED TO ASSIST TEACHERS PARTICIPATING IN THIS PROJECT. TWENTY-TWO UNIT OR CHAPTER TESTS, 6 CUMULATIVE REVIEWS, AND 1 FINAL EXAMINATION ARE PRESENTED. OTHER REPORTS ON THIS PROJECT WERE ASSIGNED ACCESSION NUMBERS ED 003 197, ED 003 237, AND ED 003 198. (JM)

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COOPERATIVE RESEARCH PROJECT

"The Teacher, Programed Materials and Instructional Interaction"

TESTS AND FINAL EXAMINATION with Answers

RESEARCH PROJECT CENTER
WEST CHESTER STATE COLLEGE
202 Sharpless Street
West Chester, Pennsylvania

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CHAPTER TESTS AND FINAL EXAMINATIONS

CONTENTS -

This book of testing materials has been prepared for the assistance of those teachers participating in the Cooperative Research Project on "The Teacher, Programed Materials and Instructional Interaction" who will be using the TEMAC programed learning materials. These tests have been developed through the combined resources of both the publishers of the materials and the Project staff. The staff is particularly grateful to the Encyclopaedia Brittanica Press, publishers of the TEMAC materials, for permission to edit the publishers tests in order to make them more compatible with the design of the Project.

The contents of this book include twenty-two Unit or Chapter Tests, six Cumulative reviews and one Final examination. These materials are presented to the participating teachers in order to insure a uniform method of evaluating the various teaching conditions of the Project. Since the data obtained from these tests will serve as a primary source of information for measuring the outcomes of the Project, it is essential that these examinations be used in their entirety in the form in which they are herein presented. It should be understood that any teacher may at his discretion prepare and administer tests or examinations in addition to those found in this book. Copies of these additional tests must be fowarded to the Research Project Center where they will become a part of the permanent record of the Project.

TEST SCORING -

The Project will be concerned only with the raw scores obtained from the testing materials found in this book. To achieve a degree of uniformity within the test data received from the teachers it is necessary to restrict the method of scoring the tests to the following procedure. No partial credit will be given in computing the raw score. Each numbered question will be considered as a single response, and the student will receive credit only if the entire question is answered correctly regardless of the number of parts associated with the problem. The total raw score will be the number of correct responses. A record of these raw scores is to be returned to the Field Consultant at various intervals throughout the year.

The method of obtaining a student's mark on a particular test for local school use is left to the discretion of the teacher. After obtaining the information needed for the Project a teacher may readjust the marking of the test in any manner so desired. The tests are so constructed that many students will not be able to finish in the allotted time and this should be taken into consideration when computing marks.

TIME LIMITS -

To secure uniform test results a time limit has been determined for each type of test. These time limits are as follows:

Unit Tests . . . . 35 minutes

Cumulative reviews . . . . 40 minutes

Final examination . . . . 45 minutes

It is essential that these time limits be closely adhered to in order that the outcomes of the Project will rest on a valid base. The Final examination is constructed for a forty-five minute period, but a supplementary teacher-constructed test may be added in order to fulfill individual requirements set by the school district.

Participating teachers are urged to review the test materials carefully in advance so that any questions pertaining to content or procedure may be discussed with the Field Consultant.

UNIT TEST 1 (Frames 1-502)

1. Indicate the arithmetical symbols used for addition and subtraction.

2. $20 \div 2 = 10$

   20 is the ____________
   2 is the ____________
   10 is the ____________

3. Find the product of 5 x 10 x 4.

4. Whenever two numbers are separated by a parenthesis, you are to ____________.

5. Using algebraic form, write the example, not the answer, for 8 times 5 times 3.

6. In this subtraction example, $6 - 4 = 2$,

   (a) the answer, two, is called the ____________
   (b) six is called the ____________
   (c) four is called the ____________

7. In which of these examples may we drop the parentheses?

   (a) 11(25) (b) 6(7) (c) 7(a)
   (d) s(t) (e) 6(13) (f) y(z)

8. Write an algebraic expression for each of the following items:

   (a) 4 times 6 times w times y
   (b) 10 times x times y
   (c) 15 x b x a

9. In the example $36 - 9 \div 3 = ?$, which operation would you perform first?

   (a) division or (b) subtraction

10. Simplify: $14 \div 7 + 3(5)$

11. What is the value of x in the following example?

    $8 + 5 = x$

12. In the expression c + 12, ________ is a literal number.

13. List the literal numbers in the expression a + b - c.

14. In the expression A = LW, list the literal numbers.

15. Indicate in symbols "the sum of d and 7."

16. In symbols write "b added to c".

17. How would you write in symbols "the sum of m and n and 12p?"

18. How would you write in symbols "fifteen increased by s?"

19. How would you write in symbols "2d plus 5c?"

20. Which of these is an algebraic expression? x, 21, 19, 4t

21. This expression contains ____________ terms (number).
    $3m + 2n - 6$

22. What is the fourth term of this expression?
    $9r - 2 + s - 7$

23. Write the algebraic expression for "14 minus a".

24. Write the algebraic expression for "y subtracted from 10".

25. Write the algebraic expression for "a decreased by b".

26. Using standard algebraic form, write the product of "four times three".

27. Write the expression "three times t".

28. Using standard algebraic form, write "the product of c times b".

29. Using standard algebraic form, write "the product of five times seven times x times y".

30. If x represents a number, then eight times the number plus four is ____________.

31. If a represents a number, then five less than four times the number is ____________.

32. If c represents a number, then one-third the number increased by 9 is ____________.

33. If Joe was 59 inches tall last year, and has grown p inches since, how tall is he now?

34. Sue weighs y pounds. If she has gained six pounds since last year, how much did she weigh then?

35. Joe had ten dollars last week. If he has spent x dollars, how much does he have left now?

36. If one popsicle costs five cents, how much will x popsicles cost?

37. How much will one pack of note paper cost, if q packs cost eighty cents?

38. Janice weighs one hundred twenty pounds. If Jane weighs m pounds less than Janice, how much does Jane weigh?

39. Jim weighs one hundred forty pounds. If Jack is b pounds heavier than Jim, how much does Jack weigh?

40. A man is forty-two years old. How old was he x years ago?

41. Jean is eleven years older than Paul. How old is Jean if Paul is c years old?

42. If Sue is z pounds heavier than Shirley, how much does Sue weigh if Shirley weighs w pounds?

43. If Mary weighs y pounds less than June, how much does Mary weigh if June weighs b pounds?

UNIT 2 (Frames 503-975)

1. Simplify: $4 + 2(2 + 4)$

2. Simplify: $5(8 + 2)$

3. Simplify: $60 - 5(8 + 2)$

4. Simplify: $2 + 7(10 \div 2)$

5. Simplify: $48 \div 2 - 5(3)$

6. Simplify: $3(45 \div 9) - 2(3 + 4)$

7. Simplify: $3(2 + 1) + 25 \div 5$

8. Simplify: $4(8) - 18 \div 6 + 1$

9. Two factors of 15 are 3 and __________.

10. Some numbers have only two factors, the number itself and 1. Such numbers are called __________ numbers.

11. What are the prime factors of 30?

12. Two factors of 9x are 9 and x. Nine is the ____________ coefficient of x.

13. In the expression 9x, x is called the ______________ coefficient of 9.

14. If you had the expression y alone, would y have a coefficient?

15. In the expression x^6, x is called the ____________, and 6 is called the ______________.

16. Write in exponential form 2(2)(2)(2).

17. Write in exponential form 6 y y.

18. Evaluate 10^3.

19. Evaluate 1^6.

20. What does $(rs)^3$ mean?

21. The statement that ab = ba is an example of the ____________ Principle for Multiplication.

22. According to the __________ Principle for Addition, any problem in addition in the form (x + y) may be written also ______________.

23. If "2x" is a term and "$3y^2$" is a term. Is the product "$6xy^2$" a term?

24. Find the product of the following monomials.
$4(x)(x^2)(x^5)$

25. According to the __________ Principle for Addition, $(x + y) + z$ may also be written $x + (y + z)$.

26. Find the product of the following.

$$3a^2b^3c(2ab^3)(4a^4b^2)$$

27. Evaluate $(a^2 + a - c)$ if $a = 2$, $c = 3$.

28. The unlike term here is __________.

$2xy^2$, $6xy^2$, $-x^2y$, $-10xy^2$

29. Subtract the following terms:

$17x - 16x =$ __________

30. Combine $15y - 9y + 10y$.

31. What is the sum in this expression, if the value of x is equal to 6?

$x + 5 =$

32. Evaluate $(b - 5)$ if b is equal to 8.

33. Evaluate $\frac{y}{5}$ if y is equal to 20.

34. Evaluate $(6x - 4)$ if x is equal to 5.

35. Evaluate $(x + y - z)$ if $x = 6$, $y = 7$, and $z = 3$.

36. Evaluate $(xy - w)$ if $x = 4$, $y = 3$, and $w = 7$.

37. Evaluate $(2r + 3s + 5t)$ if $r = 3$, $s = 6$, and $t = 1$.

38. Evaluate $\left(g + \frac{h}{m}\right)$ when $g = 3$, $h = 8$, and $m = 4$.

39. Evaluate bc^2 when b equals 8 and c equals 3.

UNIT TEST 3 (Frames 976-1513)

1. $\frac{80b}{10} =$ ________

The multiplication, addition, and subtraction axioms state that if the same operation is performed on both sides of the equation, the value is not changed. In the examples below, perform the correct operation to balance the equation.

2. $y = 6$
$10y =$ ________

3. $2x = 5$
$2x +$ ___ $= 12$

4. $21b = 84$
$7b =$ ________

5. $9a = 36$
$9a - 4 =$ ________

6. $7y = 56$
$y =$ ________

7. $5x = 52$
$x =$ ________

8. Check the equation, $13x = 91$ using $x = 7$.

Solve as indicated:

9. $\frac{0}{13} =$ ________

10. Solve this equation for x:

$\frac{x}{5} = 7$
$x =$ ________

11. Find the root of the equation

$46 = n + 18$
______ $= n$

12. Solve for b.

$b - 6\frac{1}{3} = 25$

$b =$ ________

13. Write this as an algebraic equation. Do not solve. The product of a number and 15 is equal to 60.

14. Write the equation, not the solution, for:

One sixth of a number is $12\frac{1}{2}$.

15. Write the equation, not the solution, for:

A number increased by 25 is 81.

16. Write the equation for this example. Do not solve.

Dick has nine dollars more than Jim. If Dick has twenty dollars, how many dollars does Jim have?

17. Write the equation. Do not solve.

Mary said "After spending $9 for a sweater, I have $6 left." How much did Mary have before buying the sweater?

18. After reading 97 pages of his book, John had read one-third of the book. How many pages were there in the book? (Write the equation. Do not solve.)

19. Solve for x. $7x + 3 = 45$

$x =$ ________

20. Solve this equation for y:

$50y - 32 = 218$

21. Solve this equation for x:

$\frac{x}{2} - 3 = 4$

22. Solve this equation for y.

$\frac{y}{5} - 1 = 3$

23. Solve this equation by doing the division first and then the subtraction. Do all of the work required.

$4x + 6 = 42$

24. Solve this equation for x.

$\frac{x}{3} + 5 = 13$

25. Combine like terms and solve for x.

$2x + 4x - 1 = 14 + 9$

26. Write the complete check for this equation, using the root $y = 6$.

$7y - 3y - 2 = 18 + 4$

27. The reciprocal of 9 is __________.

28. The reciprocal of 3/4 is __________.

29. Solve for x, using the principle of multiplication inverse.

$\frac{3}{4}x - 30 = 9$

30. Write the complete check for this example, using the root x = 20.

$\frac{3}{4}x = 15$

31. Solve for x:

$\frac{2}{3}x + 6 = 18$

x = ______

UNIT TEST 4 (Frames 1514-1970)

1. The legs of an isosceles triangle are equal to ten inches each, and the base is equal to eleven inches. Write the correct formula and find the perimeter of the triangle.

2. One side of an equilateral triangle is 7 inches. Find the perimeter of this triangle by first writing the correct formula.

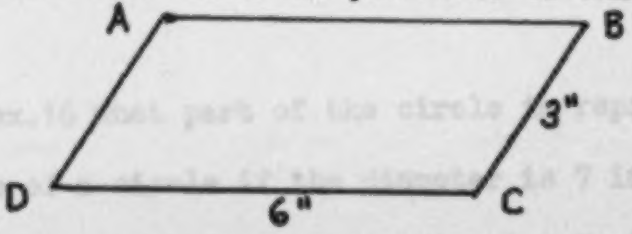
3. One side of a square is six inches. What is the perimeter of the square?

4. What is the length of one side of a square if the perimeter is eighty inches?

5. Write the correct formula and find the perimeter of a rectangle whose base is twelve inches and whose altitude is nine inches.

6. Write the formula for finding the perimeter of a parallelogram when p represents the perimeter, b represents the base, and s represents the side.

7. Use the correct formula to find the perimeter of this parallelogram.

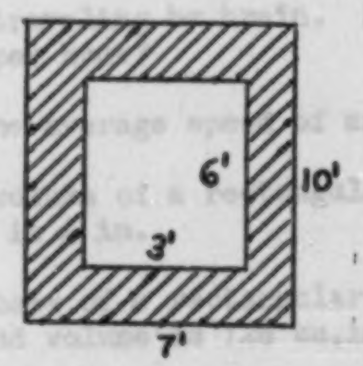


8. Find the area of a rectangle with a base of 10ft. and an altitude of 8 ft. Write the formula, show all of your work, and lable your answer.

9. Find the base of a rectangle whose area is 35 sq.ft. and whose altitude is 7 ft. Show all of your work and label your answer.

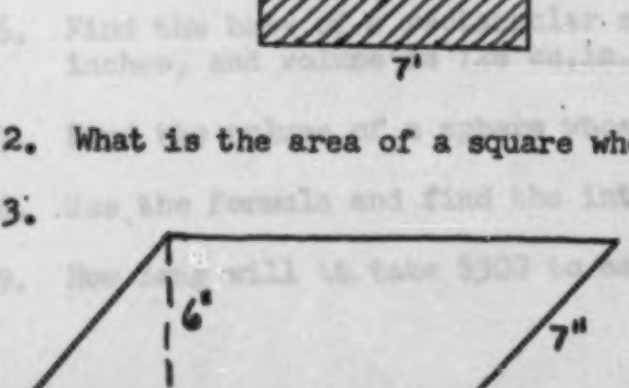
10. How much will it cost to paint a wall which is eight feet high and fifteen feet long, if it costs $1.10 to paint one square foot?

11. Find the area of the part which is shaded in the figure at the left.

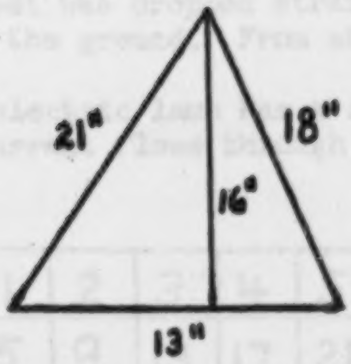


12. What is the area of a square whose side is 6 feet?

13. What is the area of the parallelogram?

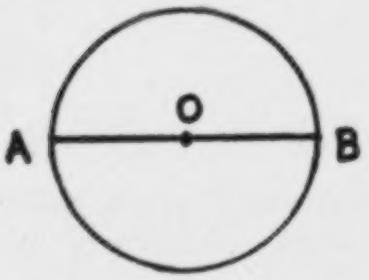


14. In the triangle at the left, what is the altitude?



15. Find the area of the triangle in ex. 14.

16. In the circle at the left, what part of the circle is represented by line AB?



17. In the figure in ex.16 what part of the circle is represented by line OB?

18. What is the radius of a circle if the diameter is 7 inches?

19. Find the circumference of a circle whose diameter is 7 inches.

20. Find the circumference of a circle whose radius is 3 inches.

21. Find the area of a circle whose radius is 8 inches.

22. Find the area of a circle whose diameter is 20 feet, using the formula containing the radius.

23. Frank is traveling by train. How far will he go in 26 hours at the rate of 55 miles per hour?

24. What is the average speed of an airplane that travels 920 miles in 4 hours?

25. Find the volume of a rectangular solid whose base is 9 in., height is 5 in., and width is 4 in.

26. Find the base of a rectangular solid whose width is 7 inches, height is 6 inches, and volume is 126 cu.in.

27. Find the volume of a sphere whose radius is 3 inches.

28. Use the formula and find the interest on $260 at 4% for 5 years.

29. How long will it take $300 to earn $72 at 4%?

30. **An object was dropped straight down from a plane. Ten seconds passed before it hit the ground. From what height was it dropped?**

31. **If an electric lamp has a resistance of 220 ohms and the voltage is 110, how much current flows through the circuit?**

32.

X	1	2	3	4	5	6	7
Y	5	9	13	17	21	25	29

What formula is represented by this table?

y = __________

UNIT TEST 5 (Frames 1971-2760)

1. If +6 dollars stands for a gain of 6 dollars, what number will stand for a loss of 3 dollars?

2. How would you represent 35 miles East, using a signed number?

3. What is the opposite of -14?

4. How would you represent 350 miles South, using a signed number?

5. Using a signed number, show how many points above or below 75 is a grade of 92.

6. Using a signed number, show how many points above or below 90 is a grade of 65.

7. The absolute value of -15 is ________.

8. A person gains 7 pounds and then gains 6 more pounds. Represent the total change in weight, using a signed number.

9. What is the sum of (-7) and (-2)?

10. Add 15 and 13.

11. What is the answer? (+12) + (-3) = ________

12. Add (-35) + (+14).

13. Add (+16) and (-16).

14. Add (-17) + (20) + (-4) + (+8).

15. Add 12 + 16 + 3.

16. Add -9, -6, -7, -2.

17. Multiply 3 (+6).

18. What is the product of 4 and -8?

19. What is the product of -2 and -15?

20. Multiply -7(-5)(+5).

21. Divide $\frac{-16}{-4}$

22. Divide $\frac{24}{-6}$

23. Divide $\frac{-50}{10}$

24. Subtract $(+14) - (+6)$.

25. Subtract $(-5) - (-3)$.

26. Subtract $(-3) - (+7)$.

27. Subtract $(+4) - (-8)$.

28. Subtract $(-7) - (-7)$.

29. Combine $x + x$.

30. Combine $7a - 10a$.

31. Combine $8y + 3y - 5y$.

32. Combine $-b + 6b + 7b - 3b$.

33. Arrange this polynomial in order.
$3b + 6d + 7e - 2c + 4a$.

34. Add
$$\begin{array}{r} 2a + 6b + 3 \\ 4a + b - 5 \\ a - 8b + 4 \\ \hline \end{array}$$

35. Add
$$\begin{array}{rrrrr} & -3x & & & -2y^3 \\ & & + x^2y & + 2xy^2 & - y^3 \\ +4x^3 & & -7x^2y & + 5xy^2 & - 6y^3 \\ \hline \end{array}$$

36. Subtract
$$\begin{array}{r} 4x^2 + 2x + 1 \\ x^2 - 4x + 3 \\ \hline \end{array}$$

37. Subtract
$$\begin{array}{rrrr} a^3 & & + 4a & \\ 5a^3 & + a^2 & - 5a & + 7 \\ \hline \end{array}$$

38. From $(+7a)$ subtract $(-5a)$.

39. Subtract
$$\begin{array}{r} -21a \\ -21a \\ \hline \end{array}$$

40. Multiply $-6x^2 (3x^5)$.

41. Multiply $5x^2 (-7x^3)(-2x)$.

42. Multiply $(-9x^3)^2$.

43. Simplify $(-3x^2)^3$.

44. Simplify $(cd^2e^5)^3$.

45. Divide $\frac{48x^6}{-6x^2}$

46. Divide $\frac{-30x^3}{-3x}$

47. Divide $\frac{-6a^2b}{-3a^2b}$

48. Divide $\frac{25abc^2}{-5c}$

49. Divide $\frac{-72x^4y^2}{9x^3y}$

50. Divide $\frac{d^2e^4f^2}{d^2e^4f^2}$

UNIT TEST 6 (Frames 2761-3030)

1. Change to lowest equivalent terms.

$-\frac{16}{32} =$ ______

2. Change to lowest equivalent terms.

$\frac{18y}{42y} =$ ______

3. The highest common factor of both numerator and denominator is __________.

$\frac{13y^3}{17y^4}$

4. The highest common factor of both numerator and denominator is __________.

$\frac{12x^3}{36x^5}$

In examples 5-9, change each fraction to the lowest equivalent terms.

5. $\frac{ab^2c}{a^2b^3c^2} =$ __________

6. $\frac{-17x^2y^3}{34x^3y^4} =$ __________

7. $\frac{-49a^3b^2}{-7ab^2} =$ __________

8. $\frac{-20a^2b^3c^4}{4a^4b^3c^2} =$ __________

9. $\frac{-10x^4}{5x^6} =$ __________

10. How many signs of a fraction may be changed without changing the value of the fraction?

11. Is $-\frac{-x}{-y} = \frac{x}{y}$?

12. Is $\frac{a}{b} = \frac{-a}{-b}$?

13. Is $\frac{-c}{-d} = \frac{-c}{d}$?

14. Is $\frac{x}{-y} = -\frac{-x}{y}$?

15. Is $\frac{7}{-19} = \frac{-7}{19}$?

16. Is $-\frac{-a}{b} = \frac{a}{b}$?

Arrange the terms of the expression in descending order of the powers of one unknown. Use alphabetical order.

17. $7xy + x^2 - y^2 =$ ______________

Multiply in each example. (18-23)

18. $2(a + b + 8c) =$ ______________

19. $-3(a^2 - 7ab + b^2) =$ ______________

20. $-5(-6x^4 - 5) =$ ______________

21. $-2x(x - y + z) =$ ______________

22. $xy(xy + x^2y^2 - x^3y^3) =$ ______________

23. $-2ab(a^2 - b^2 + 2ab) =$ ______________

24. The numerical coefficient of $17y^3$ is ______________.

25. The numerical coefficient of $-a^2$ is ______________.

26. The numerical coefficient of the quantity within the parentheses is ______________. $5(a^2 + 4a + 8)$

27. Here, the numerical coefficient of the quantity within the parentheses is ______________. $-(y^2 + 2y + 6)$

28. Remove the parentheses in this example. $-(12x^2 - 6)$

Remove the parentheses in each example 29-31.

29. $+(10 - 5b)$

30. $-(3a - 7b)$

31. $-(-3x^3 + 5x^2 - 2x + 8)$

32. Remove the parentheses and combine terms.

$$(7x + 2y - 4z) + (2x - 8y - 2z)$$

33. Remove parentheses and simplify:

$$6x - (3x + 6)$$

34. **Simplify:**

$$(8x + 4y) - (-3x + 4y)$$

35. From (11x - 5y) subtract (-8x - 2y).

36. **Simplify:**

$$(4a - 7) - (4a - 3) + (5a + 6)$$

37. **Simplify:**

$$7c - 4d - 2(4c - 3d)$$

38. **Simplify:**

$$3(5a - 4b) - 2(-4a + 6b)$$

39. **Simplify:**

$$7 + \left[4 + (9 - 5x)\right]$$

40. **Simplify:**

$$18 - \left[3 - (6x - 9)\right]$$

UNIT TEST 7 (Frames 3031-3357)

1. Divide $\frac{+36b^2}{9b^2}$ = ________

2. Divide $\frac{+45b^4c}{+5b^3c}$ = ________

3. Divide $\frac{-28c^2d}{-4c}$ = ________

4. Divide $\frac{-49cdf}{7cd}$ = ________

5. Divide $8\overline{)\,32x^2 - 24y^2}$

6. $(8x^3 - 6x^2) \div 2x =$ ________

7. $(21x + 35y) \div 7 =$ ________

8. $(cd + cf) \div c =$ ________

9. $\frac{-18z^3 + 24z^2 - 48z}{-3z}$ = ________

10. $\frac{5a^{10} - 30a^8 + 15a^6 - 45a^4 + 60a^2}{5a^2}$ = ________

11. Multiply $\begin{array}{r} z + 7 \\ \underline{z + 8} \end{array}$

12. Multiply $\begin{array}{r} a - 7 \\ \underline{a - 2} \end{array}$

13. Multiply $\begin{array}{r} 3x + 4 \\ \underline{5x + 3} \end{array}$

14. Multiply $\begin{array}{r} 4b - 9c \\ \underline{5b + 9c} \end{array}$

15. Multiply $\begin{array}{r} h - 3 \\ \underline{h + 4} \end{array}$

16. Find the area of a rectangle whose height is $(c + 9)$ feet, and whose base is $(c + 4)$ feet.

17. A plane travels at $(x - 7)$ miles per hour. How far will it go in $(x + 13)$ hours?

18. Simplify $\frac{-72}{-8}$ = ________

19. **Simplify:** $\frac{144}{-12} =$ ________

20. **Simplify:** $\frac{99}{11} =$ ________

21. **Simplify:** $\frac{-42}{6} =$ ________

22. **Simplify:** $\frac{-b^3}{b} =$ ________

23. **Simplify:** $\frac{+x^5}{+x^5} =$ ________

24. **Simplify:** $\frac{-x^3}{-x^{12}} =$ ________

25. **Simplify:** $\frac{42c^7d}{7c^3} =$ ________

26. **Simplify:** $\frac{121x^3z}{11xyz} =$ ________

27. **Simplify:** $\frac{16a + 32a^4}{4a} =$ ________

Divide and check your answers in examples 28-29.

28. $y - 3 \,\overline{)\, y^2 - y - 6}$

29.. $(10b^2 + 44b + 16) \div (2b + 8)$

30. **Divide:**

$$8x - 6 \,\overline{)\, 8x^3 - 22x^2 + 60x - 36}$$

31. **Divide and check your answer. Show all work.**

$$2c + 6 \,\overline{)\, 18c^2 + 18c - 27}$$

32. **Divide after you arrange in descending order of powers of (w).**

$$(-4w^2 + 6w^3 - 18 + 7w) \div (w + 3)$$

UNIT TEST 8 (Frames 3358-3654)

1. The ______________ of a number tells the power of the number.

2. The power of x^{12} is ________.

3. The highest exponent of the unknown in a first degree equation is __________.

4. This is a __________ degree equation.

$c - 8 = 10$

Solve each equation in examples 5 - 9.

5. $\frac{y}{6} = 36$

6. $y + 8 = 20$

7. $n - 12 = 9$

8. $4x = 35 - x$

9. $3x = 2x + 10$

10. Write the complete check for this equation, using the root ($y = 16$).

$8y = 5y + 48$

11. Solve and check: $8c + 4 = 7 - 4c$

$c =$ __________

12. Solve for b: $3b + 22 = 16b - 30$

13. Solve for x: $35 = 16x + 87$

14. Solve for t: $-18t = +270$

$t =$ __________

15. Solve for x: $-27x = -324$

$x =$ __________

16. Solve for x: $6x - 30 + 3x = 4x + 25 + x$

17. Solve and check: $-7m - 75 = 11m - 21$

$m =$ __________

18. Solve for a: $4(a - 6) = 44$

$a =$ __________

19. Solve for y: $7(y + 2) = 5(3y - 8)$

$y =$ __________

20. Solve for s: $5s + (3s + 4) = 15 - (s - 7)$
$s =$ ________

21. Write as a fraction: 7 divided by 10.

22. Write as a fraction: m divided by 8.

23. Write as a fraction: c divided by d.

24. Write as a fraction: 16 divided by x.

25. Solve for a: $ac = b$
$a =$ ________

26. Solve for x: $7x + a = 36a$
$x =$ ________

27. Solve for x: $x - 17 = 3n$
$x =$ ________

28. Solve for y: $\frac{y}{b} = d$
$y =$ ________

29. Solve for x: $ax - a^2 = 2a^2 - 2ax$
$x =$ ________

30. Solve for x: $3x - 2(5x - 4m) = -8x$
$x =$ ________

31. $p = 4s$ is the formula for finding the perimeter of a square. The coefficient of s is ____________ .

32. The formula for finding the volume of a sphere is $4/3\pi r^3$. The coefficient of π is ____________.

33. Solve for R: $E = IR$
$R =$ ____________

UNIT TEST 9 (Frames 3655-4027)

Grades in an American History Class

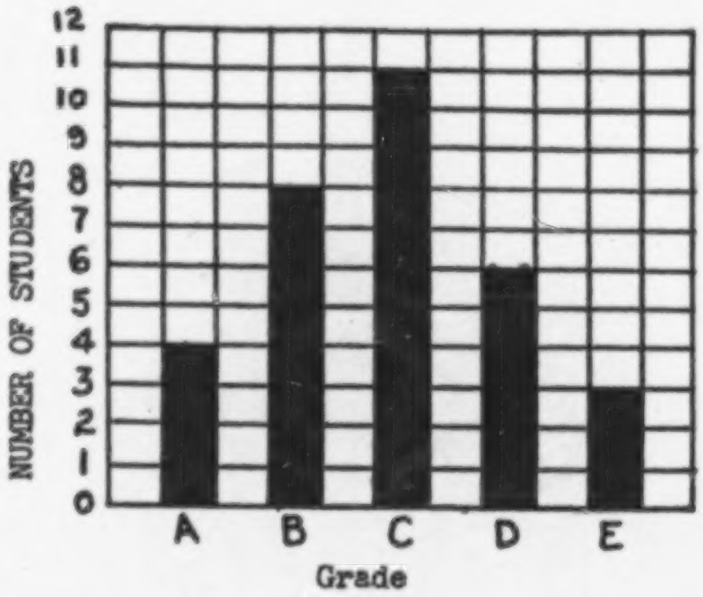


Figure 1

1. The graph in figure 1 is called a ________________graph.

2. Referring to figure 1, the number of students attaining a grade of D is ___________.

3. The number of students attaining a grade lowes than B is ____________.

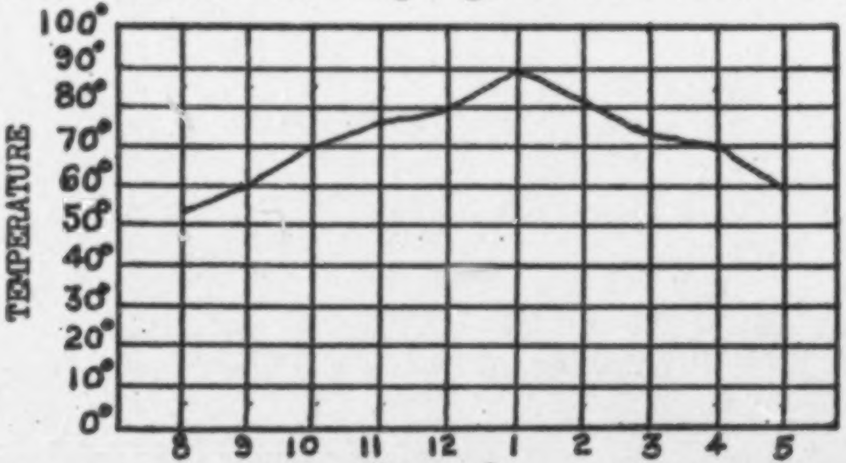


Figure 2

4. The graph in figure 2 is called a __________________ graph.

5. Jane recorded the change in temperature from 8 a.m. to 5 p.m., and she made the graph in figure 2.

   How many degrees change in temperature took place between 10 a.m. and 1 p.m.? ___________

6. During the period that Jane recorded, at what time was the temperature lowest? ________________.

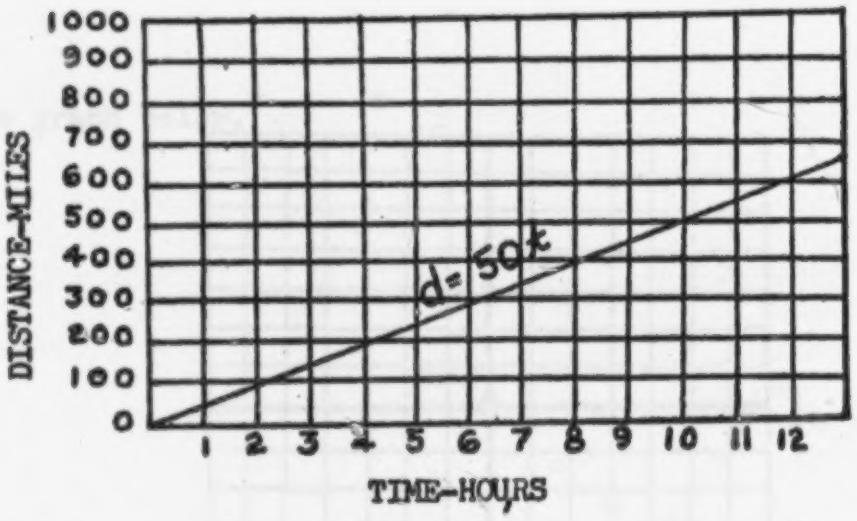


Figure 3

7. The graph in figure 3 is called a __________________ graph.

8. If John travels at a speed of 50 m.p.h., the graph of his distance per-hour will be the same as the graph in figure 3. How far will he have traveled in five hours? ______________.

9. How long will it take him to travel 350 miles? ______________.

10. The abscissa is the ______________ axis.

11. The ordinate is the ______________ axis.

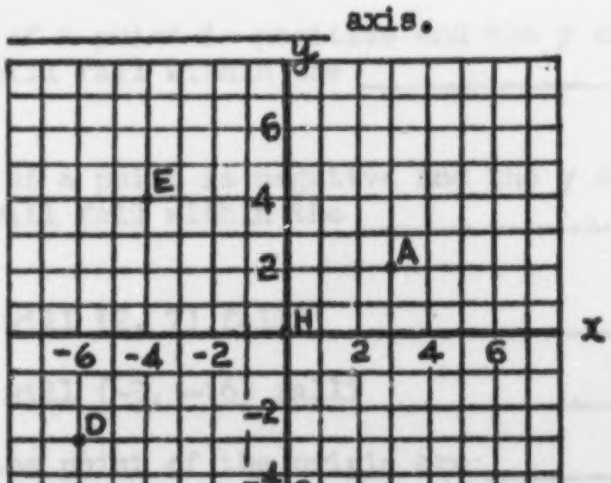


Figure 4

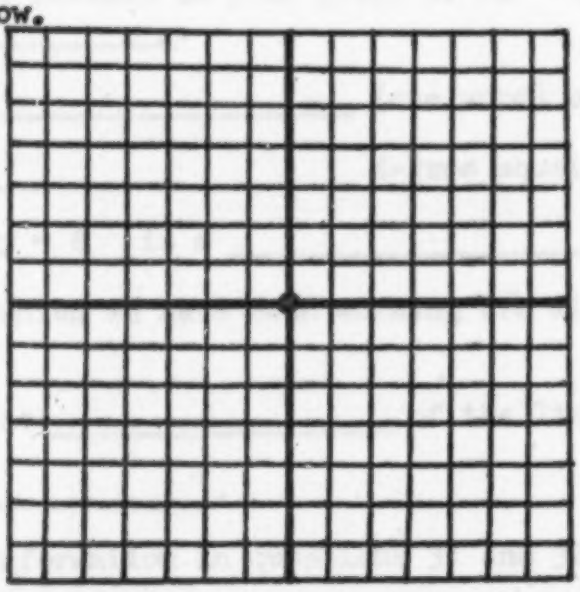
Use figure 4 for examples 12-14.

12. The co-ordinates of point B are ______________.

13. The co-ordinates of point C are ______________.

14. The co-ordinates of point E are ______________.

15. Label the graph below.



On the figure for example 15, plot the points given in examples 16, 17 and 18.

16. (6, 4) A

17. (-7, 5) B

18. (3, -6) C

19. If the x co-ordinate of a point is positive and the y co-ordinate is negative, the point will fall within the ____________________ quadrant.

20. If the x co-ordinate of a point is negative and the y co-ordinate is positive, the point will fall within the ____________________ quadrant.

21. Within what quadrant will (2, 7) fall? ________________.

22. Within what quadrant will (-3, -16) fall? ________________.

23. The co-ordinates of the point of the origin are ________________.

24. Within what quadrant does the point of the origin lie? ________________.

25. Evaluate this equation for the indicated values.

$x + y = 7$

x	y
4	
0	
-2	

26. Solve and plot $6x + 2y = 12$

Use your own graph paper and show all work.

27. Is the point (1, -2) located on your graph of $6x + 2y = 12$? (example 26) ______________.

28. $7x + 2y = 8$ is a ________________ (one word) equation.

29. $ux + 2y = 8$ is a ________________ degree equation.

30. The graph of $7x + 2y = 8$ is a ________________ line.

31. The equations with which we have been working are all in the general form $y = mx + b$.

The "m" refers to the ________________ of the line.

32. "b" is the ________________.

33. Making use of the information in questions 31 and 32, plot the graph of:

$$y = \frac{3}{4}x + 2$$

(Use graph paper and show all work)

34. Referring to your graph for example 33, what is the abscissa where the line intersects the x-axis? ________________________________.

35. What two methods could you use to plot the graph of:

$6x - 2y = 19$

(a) ____________________

(b) ____________________

UNIT TEST 10 (Frames 4028-4300)

1. When two independent equations have a common solution, they are called __________________ equations.

2. Evaluate the equation $y = \frac{3x}{2} - \frac{25}{2}$, when x has the value of 10.

3. Evaluate $y = \frac{5x}{4} - \frac{26}{4}$, when x has a value of 6.

4. Evaluate the equation $y = \frac{4x}{3} - \frac{12}{3}$, when x has a value of 3.

5. If $c = a + b$,
and if $c = x + y$,
then $a + b =$ __________.

6. Solve this system of equations by the substitution method.

   (1) $x + y = 12$

   (2) $x - y = 6$

7. Solve, using substitution method.

   (1) $a + b = -9$

   (2) $a - b = -11$

8. Solve this system of equations for m, using subtraction.

   (1) $2m + 6n = 12$

   (2) $m + 6n = 9$

9. Solve these equations for x, using addition.

   (1) $x + y = 15$

   (2) $x - y = 3$

10. Solve these equations for x, using the addition-subtraction method.

    (1) $2x + 3y = 14$

    (2) $-2x + 3y = -6$

11. Solve for both x and y. Use the addition-subtraction method.

    (1) $5x + 10y = 30$

    (2) $5x + 4y = 6$

12. Solve for both x and y, using the addition-subtraction method.

(1) $-2x + 5y = -3$

(2) $2x - y = -1$

13. Solve for c and d.

(1) $5c + 4d = 27$

(2) $c - 2d = 11$

UNIT TEST 11 (Frames 4301-4601)

1. The sum of two numbers is 42. The larger number is 6 times the smaller number. What are the numbers? Solve this system of equations by the addition-subtraction method.

2. The greater of two numbers is 3 times the smaller. The sum of the two numbers is 64. What are the numbers?

3. Four times a certain number, decreased by 5, equals the number increased by 4. Find the number.

4. The sum of three numbers is 130. The second number is 5 times as large as the first, and the third number is 4 times as large as the second number. Find the numbers.

5. The sum of three consecutive integers is 84. Find the integers.

6. The sum of two consecutive odd integers is 124. Find the integers.

7. Joe and Ben started driving toward each other at the same time from houses which are 532 miles apart. Joe drives 40 miles per hour, while Ben drives 36 miles per hour.

   Write the equation and find in how many hours Joe and Ben will meet.

8. Train A travels 10 miles per hour faster than Train B. They leave the same station at the same time going in opposite directions. If they are 480 miles apart in 6 hours, find the rate of speed of each train. Write the equation and solve.

UNIT TEST 12 (Frames 4602-5082)

1. What is the product of $2m(m^2 + 4)$?
2. What is the product of $-4a(a^2 - 2ab + b^2)$?
3. Factor: $6x - 6y =$ __________
4. Factor: $a^2 + 4a =$ __________
5. Factor: $7x^4 + x^3 - x^2 - 42x =$ __________
6. Factor: $5k^3 + 5k^2 - 60k =$ __________
7. Factor: $3y^5 - 6y^4z - 9yz^5 =$ __________
8. Factor: $27a^2b^3 - 18a^3b^2 + 9a^2b^2 =$ __________
9. Square: $(b^6)^2 =$ __________
10. Cube: $(4x^3)^3 =$ __________
11. Square: $(-11a^2b^2)^2 =$ __________
12. Simplify: $\sqrt{1} =$ __________
13. Simplify: $\sqrt{36} =$ __________
14. Simplify: $\sqrt{x^8} =$ __________
15. Simplify: $\sqrt{x^2y^4z^6} =$ __________
16. Simplify: $\sqrt{64x^4y^8} =$ __________

Multiply mentally examples 17-21. Write answers.

17. $(x + 7)(x - 7) =$ __________
18. $(4x - 7y)(4x + 7y) =$ __________
19. $(7x^4 - 2y^4)(7x^4 + 2y^4) =$ __________
20. $(a + 2)(a - 2)(a^2 + 4) =$ __________
21. $(2x + 3y)(2x - 3y)(4x^2 + 9y^2) =$ __________

Factor each, in examples 22-24.

22. $64 - 25x^2 =$ __________
23. $144x^6 - 49y^8 =$ __________
24. $(a^2 - 1) =$ __________

25. Factor: $(x^4 - 16b^4) =$ ____________

26. Factor: $(c^2d^2 - a^2b^2) =$ ____________

27. Factor: $(1 - x^2y^2z^2) =$ ____________

28. Factor: $(20x^2 - 45y^2) =$ ____________

29. Factor: $(4x^2 - 100) =$ ____________

30. Factor: $(y^3 - 16y) =$ ____________

31. Factor: $(9x^3 - 81xy^2) =$ ____________

Multiply mentally in each example 32-36.

32. $(k - 10)(k - 5) =$ ____________

33. $(a + 6)(a - 2) =$ ____________

34. $(3y + 5)(2y - 4) =$ ____________

35. $(3a + 5b)(2a - 3b) =$ ____________

36. $(5 - 7x)(4 - 2x) =$ ____________

UNIT TEST 13 (Frames 5083-5283)

Factor completely:

1. $x^2 + 2x + 1 =$ ________
2. $x^2 + 5x + 4 =$ ________
3. $x^2 + 10x + 9 =$ ________
4. $x^2 + 9x + 14 =$ ________
5. $x^2 + 8x + 15 =$ ________
6. $x^2 + 7x + 6 =$ ________
7. $x^2 - 10x + 21 =$ ________
8. $a^2 - 11a + 24 =$ ________
9. $y^2 - 15y + 54 =$ ________
10. $b^2 - 22b + 121 =$ ________
11. $c^2 - 3c - 10 =$ ________
12. $x^2 - x - 2 =$ ________
13. $x^2 + 5x - 24 =$ ________
14. $a^2 - 2a - 48 =$ ________
15. $x^2 + 5x - 36 =$ ________
16. $4x^2 + 12x + 9 =$ ________
17. $6x^2 + 15x + 9 =$ ________
18. $4x^2 + 8x + 4 =$ ________
19. $9x^2 - 12x + 4 =$ ________
20. $9x^2 - 18x + 9 =$ ________
21. $2ax^2 - 10ax + 8a =$ ________
22. $14x^2 - 21x - 14 =$ ________
23. $10a^2 - 4a - 14 =$ ________
24. $9x^2 - 36y^2 =$ ________
25. Is $16x^2 - 40x - 25$ a perfect square trinomial? ________

UNIT TEST 14 (Frames 5284-5461)

1. The root of this linear equation is x = ______________.

   Equation $\frac{x}{7} = 6$

2. The root of this equation is x = ______________.

   Equation $x - 9 = 6$

3. What is the product of

   $(b - 5)\ (b + 4)$, if $(b - 5) = 0$?

4. If $(x + 7) = 0$, what value must x have?

5. Find one root for the equation $c^2 - 3c - 4 = 0$

6. Solve for m

   $m^2 + 8m = 0$

7. Using the proper order, write the terms of this equation equal to 0. Solve.

   $b^2 + 8 = 9b$

8. Solve for n:

   $-n^2 + 11n - 24 = 0$

9. Solve for r:

   $2r^2 + r = 15$

10. Solve for c:

    $36c^2 = 49$

11. If x represents a number, how would you represent the number decreased by 9?

12. If n is an even integer, how would you represent the next consecutive odd integer?

In problems 13-18, state and solve each, whenever possible.

13. The sum of three consecutive odd integers is 165. Find these integers.

14. How would you represent the sum of 12 and y, multiplied by 5?

15. Multiply the difference between 6 and x, by 7. Let x represent the larger number.

16. Is the square of 8 diminished by 10 times 8 equal to -19?

17. The product of a certain number and the number itself increased by 4 is 21. What is the number?

18. If the square of a certain number is diminished by eight times the number, the difference is -15. Find the number.

UNIT TEST 15 (Frames 5462-6150)

1. Multiply both numerator and denominator of $\frac{6x}{2y}$ by 3x and write the equivalent fraction.

2. Divide both terms of $\frac{7c^2}{8c}$ by c. Write the equivalent fraction.

3. Divide both terms of $\frac{16x^5y^2}{20x^2y^3}$ by $4x^2y^2$ What is the equivalent fraction?

4. What is the highest common factor in the fraction $\frac{x^3}{x^5}$?

5. Change $\frac{-14x^2y^2}{-28xy}$ to the lowest equivalent fraction.

6. Change to the lowest equivalent fraction: $\frac{3a(b^2 - c^2)}{12a(b^2 - c^2)}$

7. What is the equivalent of this fraction? $\frac{(c + 10)}{(c + 10)}$

8. What is the highest common factor in this fraction? $\frac{8x(x - 8)}{16x^2}$

9. Change the fraction in example 8 to the lowest equivalent fraction.

10. Change to the lowest equivalent fraction: $\frac{44a}{11a(a + 6)}$

11. Factor the polynomial in this fraction: $\frac{7a + 7b}{14a}$

12. Change the fraction in example 11 to the lowest equivalent fraction.

13. Factor $\frac{4a^2 - 9}{(2a - 3)^2}$ and change to the lowest equivalent fraction.

14. Factor and change to the lowest equivalent fraction

$$\frac{a^4 + 4a^3 + 4a^2}{a^4 + 5a^3 + 6a^2}$$

15. Multiply and change to the lowest equivalent terms:

$$3x^2\left(\frac{7}{3x}\right)$$

16. Multiply (give answer in lowest equivalent form):

$$\left(\frac{16a^2}{15b^2}\right)\left(\frac{5b}{8a}\right)$$

17. Factor, multiply, and change to lowest equivalent terms:

$$\frac{y^2 - 2y - 15}{y - 5} \cdot \frac{4y - 12}{y^2 - 9}$$

18. Invert: $a + b$

19. $\frac{a^2b}{cd^3} \div \frac{ab^3}{c^2d^2}$

20. $\frac{x^2 - 36}{(x + 6)^2} \div \frac{3x - 18}{9x + 54}$

Perform the indicated operations and simplify.

21. $\frac{4}{15} + \frac{2}{15} + \frac{8}{15}$ = ________________

22. $\frac{5}{8x} - \frac{4}{8x} + \frac{2}{8x}$ = ________________

What is the LCM in each of the examples (23-26)?

23. 14 and 7

24. 5, 10, and 15

25. $(8a)$ and $(16a)$

26. $(a - 5)(a + 5)$

Find the missing term in each example. (27-29).

27. $\frac{5}{9} = \frac{?}{45}$

28. $\frac{5}{12} = \frac{25x}{?}$

29. $\frac{3x}{y} = \frac{9ax}{?}$

30. What is the LCD of $\frac{3}{4} + \frac{1}{3} + \frac{2}{6}$?

31. Find the LCD. $\frac{x}{11} - \frac{3x}{2}$

32. Factor both denominators. The LCD is __________.

$$\frac{1}{2a + 4b} - \frac{1}{5a + 10b}$$

33. Perform the indicated operation and simplify.

$$\frac{6}{5a + 10b} - \frac{9}{8a - 16b}$$

34. Combine:

$$\frac{5}{2a - 4} - \frac{3}{6a - 12} - \frac{2}{3a + 6} = \underline{\hspace{6em}}$$

UNIT TEST 16 (Frames 6151-6330)

1. Divide: $\frac{x^{12}}{x^5}$

2. Divide: $\frac{x^7}{x^7}$

3. Divide: $\frac{x^6}{x^9}$

4. Write as a fraction: x^{-2}

5. Write as a fraction: $a^{-3}b$

6. Write as a fraction: c^2d^{-3}

7. Combine and change to the lowest equivalent terms.

$$\frac{6(7a - 2)}{15} - \frac{4(5a + 6)}{15}$$

8. Combine and change to lowest equivalent terms.

$$\frac{3a}{a^2 - 4} - \frac{4}{2a - 4}$$

9. As x increases, does the value of this fraction increase or decrease?

$$\frac{6}{x}$$

10. As x increases, does the value of this fraction increase or decrease?

$$\frac{x}{5}$$

11. If b is positive, and $b = \frac{8}{c}$, does b increase or decrease as c decreases?

12. If $y = \frac{2a}{3}$, and a is positive, does y increase or decrease as a increases?

13. Solve for f: $\frac{f}{7} = 4$

14. Solve for h: $\frac{h}{5} = \frac{7}{1}$

15. Solve for k: $\frac{k}{21} = \frac{4}{7}$

16. **Solve for g:** $\frac{g}{5} + \frac{3g}{2} = \frac{17}{2}$

17. **Solve for q:** $\frac{q + 18}{8} = \frac{q + 6}{5}$

18. **Solve for z:** $\frac{z - 9}{7} + 4 = \frac{z + 13}{8}$

19. **Solve for p:** $\frac{15}{p + 2} = \frac{9}{p - 2}$

20. **Solve for x:** $\frac{2x}{x + 3} - \frac{3x - 4}{2x + 6} = \frac{5}{x + 3}$

21. **Solve for r:** $\frac{4}{r - 2} - \frac{3r + 2}{r^2 - 4} = 0$

UNIT TEST 17 (Frames 6331-6511)

1. The sum of a number and one-fourth of the number is 70. What is the number?

2. Separate 80 into two parts such that the smaller part is equal to one-ninth of the larger part.

3. One number is 8 more than another. When the larger is divided by the smaller, the quotient is $\frac{7}{5}$. Find the numbers.

4. A dealer wishes to mix tea worth 65¢ per pound with tea worth 90¢ per pound in order to produce 40 pounds of tea which can be sold at 75¢ per pound. How many pounds of each type should be used?

5. Sea water contains 4%, by weight, of salt. How many pounds of salt must be added to 100 pounds of sea water to obtain a brine containing 12% salt?

6. Mrs. Saunders can clean the windows of her house in 3 hours. Her daughter can clean the windows in 6 hours. How long would it take them to clean the windows if they work together?

7. A bathtub can be filled through the hot water faucet in 40 minutes, or in 30 minutes through the cold water faucet. It can be drained in 20 minutes. One day both faucets were open while the drain was also open. In how many hours will the tub be full?

UNIT TEST 18 (Frames 6512-6766)

1. $\sqrt{36}$ has an index of ____________.

2. Is the square root of 50 an integer?

3. Is the cube root of 8 an integer?

4. Is the cube root of 27 a rational number?

5. Is the square root of 40 an irrational number?

6. The radicand in $2\sqrt{3}$ is ____________.

7. The symbol $\sqrt{}$ indicating square root is called the ____________.

Simplify examples 8 - 20, using the radical form.

8. $\sqrt{2} \cdot \sqrt{64} =$ ____________

9. $7\sqrt{5} \cdot \sqrt{81} =$ ____________

10. $\sqrt{1700} =$ ____________

11. $\sqrt{49r^2s^4} =$ ____________

12. $\sqrt{x^2} \cdot \sqrt{xy} =$ ____________

13. $4\sqrt{8x} =$ ____________

14. $-3\sqrt{18} =$ ____________

15. $\sqrt{x^5y^6} =$ ____________

16. $-2\sqrt{12at^3} =$ ____________

17. $\frac{1}{3}\sqrt{72} =$ ____________

18. $\sqrt{\frac{7}{18}} =$ ____________

19. $\sqrt{\frac{x}{6}} =$ ____________

20. $\sqrt{\frac{3m}{25x^2}} =$ ____________

Combine in examples 21 through 24.

21. $4\sqrt{2} + 3\sqrt{2} =$ ______

22. $7\sqrt{45x^2} - x\sqrt{125} + \sqrt{80x^2} =$ ______

23. $6\sqrt{6} - \sqrt{6} =$ ______

24. $2\sqrt{\frac{1}{2}} + \frac{1}{2}\sqrt{8} =$ ______

25. $\sqrt{6} \cdot \sqrt{50} =$ ______

26. $2\sqrt{2}\,(\sqrt{8} + 2\sqrt{2}) =$ ______

27. $(2 - \sqrt{2})\,(2 + \sqrt{2}) =$ ______

28. $(4\sqrt{3} - 5)^2 =$ ______

29. Rationalize the denominator. $\dfrac{3}{2\sqrt{2} - 2} =$ ______

30. Rationalize the denominator. $\dfrac{2 - \sqrt{2}}{1 + \sqrt{2}} =$ ______

31. Divide: $\dfrac{\sqrt{35}}{\sqrt{7}} =$ ______

32. Divide: $\dfrac{6\sqrt{72}}{3\sqrt{8}} =$ ______

33. Divide: $\dfrac{3\sqrt{xy}}{\sqrt{x^3}} =$ ______

34. Divide: $\dfrac{\sqrt{300} + 3\sqrt{27}}{\sqrt{3}} =$ ______

35. Solve: $2 + \sqrt{4x} = 6$ $x =$ ______

36. Solve: $\sqrt{7x - 6} = 8$ $x =$ ______

37. Write in exponential form: $\sqrt{x^4} =$ ______

38. Write in exponential form: $\sqrt{x^5y^7} =$ ______

39. Write in radical form: $x^{\frac{11}{3}}$

40. Write in radical form: $(mn)^{\frac{4}{5}} =$ ______

UNIT TEST 19 (Frames 6767-6931)

1. Every quadratic equation can be written in the general form of __________.

2. Arrange $16 + x^2 = 5x$ in the general form.

Make equations 3 - 8 perfect square trinomials by supplying the missing term. Do not solve.

3. $k^2 + 5k + \_\_\_\_\_ = 0$

4. $x^2 + \_\_\_\_\_ + 36 = 0$

5. $x^2 - 16x + \_\_\_\_\_ = 0$

6. $x^2 - \_\_\_\_\_ + \frac{9}{4} = 0$

7. $b^2 - \frac{1}{2}b + \_\_\_\_\_ = 0$

8. $m^2 - 7m + \_\_\_\_\_ = 0$

Find the roots of the following equations by completing the square.

9. $x^2 - 24 = 5x$

10. $a^2 + 2a = 3$

11. $x^2 - 6x = 16$

12. $12y^2 - y - 6 = 0$

13. Write the quadratic formula.

14. Solve for x, using the quadratic formula.

$$x^2 - 10x - 11 = 0$$

15. Solve for x, using the quadratic formula.

$$3x^2 - 5x = 2$$

16. Solve for x, using the quadratic formula.

$$9x^2 + 12x = 1$$

UNIT TEST 20 (Frames 6932-7127)

1. What is the ratio of 6 inches to 2 feet?

2. What is the ratio of 5 quarts to 2 gallons?

3. Is this a true proportion?

$$\frac{125}{20} = \frac{25}{4}$$

4. Name the means and the extremes in this proportion.

$$x : y = 7 : 8$$

Means ________ Extremes ________

5. What are the extremes in this proportion?

$$\frac{x}{3} = \frac{4}{2}$$

6. What are the means in this proportion?

$$\frac{a}{3} = \frac{4}{6}$$

7. What number will make this a true proportion?

$$\frac{y}{8} = \frac{3}{24}$$

8. What number will make this a true proportion?

$$\frac{7}{9} = \frac{63}{x}$$

In each of the following problems (9-12), write the proportion and solve.

9. If it takes 15 gallons of gasoline to travel 270 miles, how many gallons does it take to travel 540 miles?

10. If a tree 75 feet high casts a shadow 54 feet, how long a shadow will a 50 foot tree cast?

11. Jack sits 6 feet from the fulcrum and balances Carl who sits 8 feet from the fulcrum. If Jack weighs 72 pounds, how much does Carl weigh?

12. A weight of 30 pounds balances a weight of 50 pounds on the other side of the fulcrum. If one weight is 2 feet farther from the fulcrum than the other, where is each weight placed?

13. In our system of writing numbers, each digit has what is known as "place value". In the number 594, the digit 5 tells the number of ________.

14. In the number 673, the 7 tells the number of ______________.

15. In the number 3489, the 9 tells the number of ______________.

16. If u represents the units digit and t represents the tens digit, write the number.

17. In a two-digit number, u represents units digit and t represents tens digit; the product of the two digits is 19. Write this as an equation.

18. The sum of the digits of a two-digit number is 17. How would you represent this statement?

19. A certain two-digit number is equal to 13 times the tens digit. How would you express this fact?

20. The units digit of a two-digit number exceeds twice the tens digit by 7. How would you express this fact?

21. If the tens digit is 5, and the sum of the digits is 14, the units digit must be __________.

22. The tens digit of a two-digit number exceeds three times the units digit by 1. The number is 8 times the sum of the digits. Find the number.

23. Barbara has 20 coins in her pocket book totaling 82 cents. If she has three times as many dimes as nickels, and six times as many pennies as nickels, how many of each kind of coin does she have?

24. A boy had $3. 75 in nickels and dimes. If he had 6 more dimes than nickels, how many of each coin did he have?

25. Mr. White sent his son to buy 100 stamps, part 5-cent and part 4-cent stamps. The total value of the stamps was $4.75. How many of each kind did he buy?

UNIT TEST 21 (Frames 7128-7308)

1. A formula for finding the circumference of a circle is $C = 2\pi r$. C and r are literal numbers. Since they may change in value according to the circles in which they are used, they are referred to algebraically as ____________________.

2. The formula for finding the area of a circle is $A = \pi r^2$. Since has a specific value (approximately 3.14), it is referred to algebraically as a __________________ term.

3. If the ratio of x to y is always 12, then mathematically we say x and y vary ________________ with each other.

4. $\frac{x}{y} = \frac{k}{c}$, $x = ky$, $y = \frac{x}{k}$

   The three equations above are equivalent. They show that x and y vary ____________________.

5. When the product of two variables is constant they are said to vary ____________________.

6. $xy = k$, $x = k/y$

   The two equations above are equivalent, and they illustrate the same variation as example five. Find the third equation equivalent to these two.

   In examples 7 and 8, note whether or not x and y show a relationship of variation. If they do not, simply answer none; if they do, tell what kind of variation they show.

7. $x = 7y$

8. $y = 15/x$

9. Let x and y vary inversely. If $x = 4$ when $y = 24$, what is the value of x when $y = 3$?

10. A farmer is measuring a field, and he has two tapes from which he may choose one to use. One is marked in yards and feet, and the other is marked in feet and inches. Which tape will give the more precise measurement?

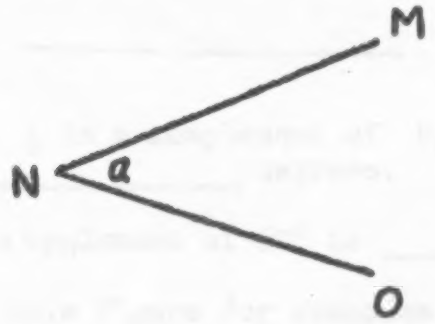
11. At present the distance between the earth and the moon can only be computed through ________________ measurement.

12. Round off 3.79216 to the nearest hundredth.

13. Round off 2.6796 to the nearest whole number.

14. A man uses a lever 8 feet long to lift a safe weighing 350 pounds. If he exerted 60 pounds of pressure on the opposite end of the lever, what was the distance of the weight from the fulcrum? Express answer to the nearest tenth.

15.



____

____

____

Identify this angle in four different ways: ________________

16. We measure angles according to the amount of ________________ around a given pount.

17. A straight angle contains ________________ degrees.

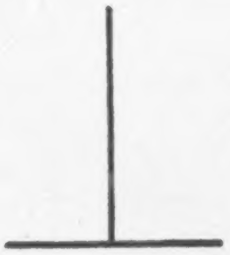
18. An obtuse angle contains ________________ degrees.

19. An acute angle contains ________________ degrees.

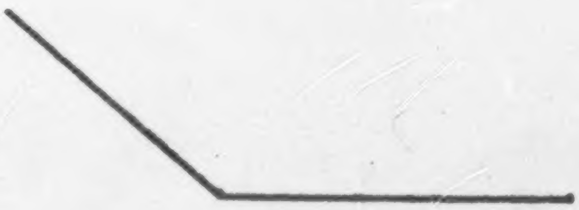
20. A right angle contains ________________ degrees..

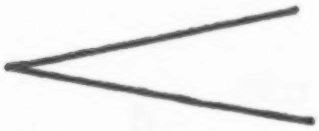
Identify the following angles:

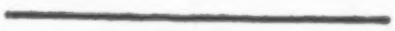
21.



22.



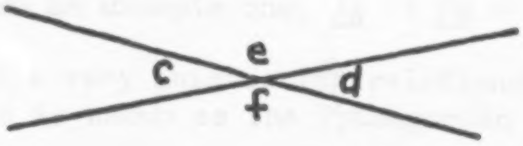
23. 

24. 

25. If a is a complement of b, and if b is equal to 35°, a is equal to ______________ degrees.

26. The supplement of 60° is ______________.

Use this figure for examples 27-30.



27. ∠c and ∠d are called ______________ angles.

28. Adjacent angles ∠c and ∠e are called ______________ angles.

29. Prove algebraically that ∠e does or does not equal ∠f. Show all of your work.

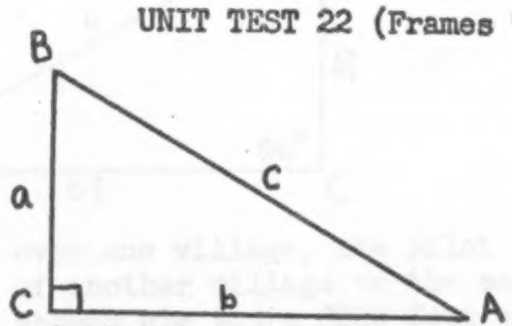
30. $\angle c = 35^\circ$ Find the number of degrees in each of the three remaining angles.

31. A certain angle exceeds three times its complement by 6°. Find the two angles.

32. An angle is seven times its supplement. Find the angles.

UNIT TEST 22 (Frames 7309-7551)

1.



In the above right triangle, the hypotenuse is ____________.

2. The sum of the three angles of any triangle equals ____________.

3. For the triangle shown in example one, $\angle A + \angle B =$ ____________.

4. Pythagoras discovered a very interesting relationship between the sides of a right triangle. This is known as the Pythagorean Theorem, and it states ____.

5. Every triangle has at least two __________ angles.

Using the Theorem of Pythagoras, solve for the unknown side of the following right triangle. $\angle C$ is always the right angle. Leave answers in radical form whenever necessary.

6. $a = 9$, $b = 4$, $c =$ ____________.

7. $a = 5$, $b = 12$, $c =$ ____________.

8. $c = 9$, $a = 3$, $b =$ ____________.

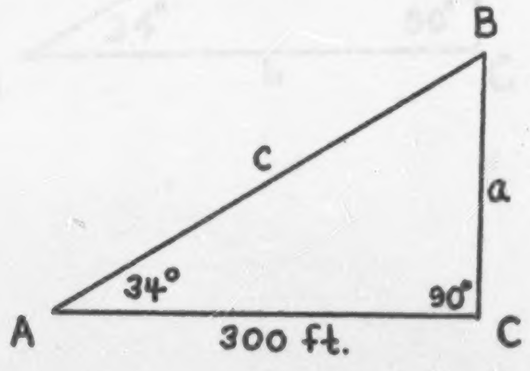
Solve for the unknown in each of the following:

9. $\frac{a}{3} = \frac{6}{9}$ $a =$ ____________

10. $\frac{3}{b} = \frac{12}{8}$ $b =$ ____________

11. At a point (A) 40 feet from the base of a flag pole, the angle of elevation is 64°. How high is the pole? $a =$ ____________

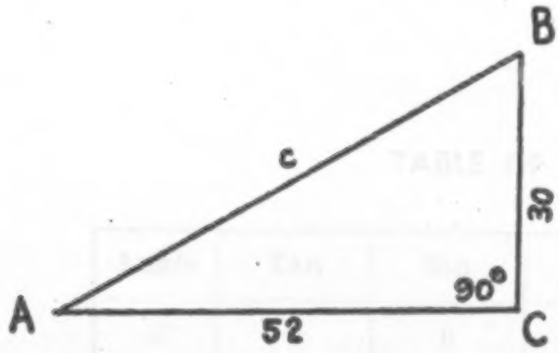
12.



Find a.

$a =$ ____________

13.

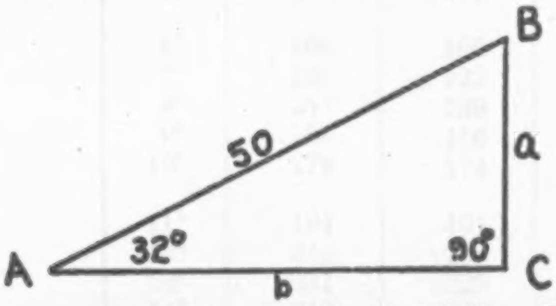


Find ∠A to the nearest whole degree.

∠A = ____________

14. When directly over one village, the pilot of a plane observed that the angle of depression of another village on the same level as the first was 9°. If his altimeter showed him to be 8200 feet above the first village, what was the distance between villages?

15.

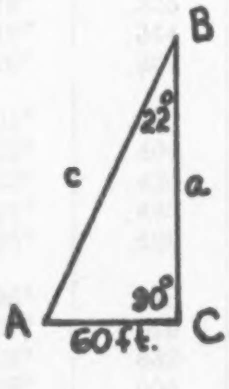


Using the sine function, find a.

a = ____________

16. A smokestack is 150 feet high. Find the length of a guy wire which is fastened to the stack at the top and makes an angle of 40° with the ground. ______________.

17.



Using the sine function, find the value of c.

c = ____________

18.

Using the cosine function, find the side adjacent to ∠A.

b = ____________

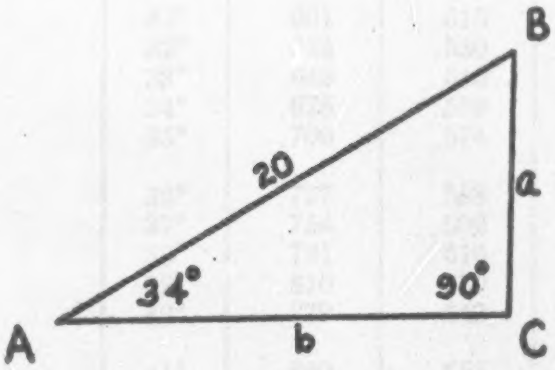


TABLE OF TRIGONOMETRIC RATIOS

Angle	Tan	Sin	Cos	Angle	Tan	Sin	Cos
0°	0	0	1				
1°	.017	.017	1.000	46°	1.036	.719	.695
2°	.035	.035	.999	47°	1.072	.731	.682
3°	.052	.052	.999	48°	1.111	.743	.669
4°	.070	.070	.998	49°	1.150	.755	.656
5°	.087	.087	.996	50°	1.192	.766	.643
6°	.105	.105	.995	51°	1.235	.777	.629
7°	.123	.122	.993	52°	1.280	.788	.616
8°	.141	.139	.990	53°	1.327	.799	.602
9°	.158	.156	.988	54°	1.376	.809	.588
10°	.176	.174	.985	55°	1.428	.819	.574
11°	.194	.191	.982	56°	1.483	.829	.559
12°	.213	.208	.978	57°	1.540	.839	.545
13°	.231	.225	.974	58°	1.600	.848	.530
14°	.249	.242	.970	59°	1.664	.857	.515
15°	.268	.259	.966	60°	1.732	.866	.500
16°	.287	.276	.961	61°	1.804	.875	.485
17°	.306	.292	.956	62°	1.881	.883	.469
18°	.325	.309	.951	63°	1.963	.891	.454
19°	.344	.326	.946	64°	2.050	.899	.438
20°	.364	.342	.940	65°	2.145	.906	.423
21°	.384	358	.934	66°	2.246	.914	.407
22°	.404	.375	.927	67°	2.356	.921	.391
23°	.424	.391	.921	68°	2.475	.927	.375
24°	.445	.407	.914	69°	2.605	.934	.358
25°	.466	.423	.906	70°	2.747	.940	.342
26°	.488	.438	.899	71°	2.904	.946	.326
27°	.510	.454	.891	72°	3.078	.951	.309
28°	.532	.469	.883	73°	3.271	.956	.292
29°	.554	.485	.875	74°	3.487	.961	.276
30°	.577	.500	.866	75°	3.732	.966	.259
31°	.601	.515	.857	76°	4.011	.970	.242
32°	.625	.530	.848	77°	4.332	.974	.225
33°	.649	.545	.839	78°	4.705	.978	.208
34°	.675	.559	.829	79°	5.145	.982	.191
35°	.700	.574	.819	80°	5.671	.985	.174
36°	.727	.588	.809	81°	6.314	.988	.156
37°	.754	.602	.799	82°	7.115	.990	.139
38°	.781	.616	.788	83°	8.144	.993	.122
39°	.810	.629	.777	84°	9.514	.995	.105
40°	.839	.643	.766	85°	11.430	.996	.087
41°	.869	.656	.755	86°	14.301	.998	.070
42°	.900	.669	.743	87°	19.081	.999	.052
43°	.933	.682	.731	88°	28.636	.999	.035
44°	.966	.695	.719	89°	57.290	1.000	.017
45°	1	.707	.707	90°	—	1	0

POWERS AND ROOTS

NO.	SQ.	SQ. ROOT	CUBE	CUBE ROOT	NO.	SQ.	SQ. ROOT	CUBE	CUBE ROOT
1	1	1.000	1	1.000	51	2,601	7.141	132,651	3.708
2	4	1.414	8	1.260	52	2,704	7.211	140,608	3.733
3	9	1.732	27	1.442	53	2,809	7.280	148,877	3.756
4	16	2.000	64	1.587	54	2,916	7.348	157,464	3.780
5	25	2.236	125	1.710	55	3,025	7.416	166,375	3.803
6	36	2.449	216	1.817	56	3,136	7.483	175,616	3.826
7	49	2.646	343	1.913	57	3,249	7.550	185,193	3.848
8	64	2.828	512	2.000	58	3,364	7.616	195,112	3.871
9	81	3.000	729	2.080	59	3,481	7.681	205,379	3.893
10	100	3.162	1,000	2.154	60	3,600	7.746	216,000	3.915
11	121	3.317	1,331	2.224	61	3,721	7.810	226,981	3.936
12	144	3.464	1,728	2.289	62	3,844	7.874	238,328	3.958
13	169	3.606	2,197	2.351	63	3,969	7.937	250,047	3.979
14	196	3.742	2,744	2.410	64	4,096	8.000	262,144	4.000
15	225	3.873	3,375	2.466	65	4,225	8.062	274,625	4.021
16	256	4.000	4,096	2.520	66	4,356	8.124	287,496	4.041
17	289	4.123	4,913	2.571	67	4,489	8.185	300,763	4.062
18	324	4.243	5,832	2.621	68	4,624	8.246	314,432	4.082
19	361	4.359	6,859	2.668	69	4,761	8.307	328,509	4.102
20	400	4.472	8,000	2.714	70	4,900	8.367	343,000	4.121
21	441	4.583	9,261	2.759	71	5,041	8.426	357,911	4.141
22	484	4.690	10,648	2.802	72	5,184	8.485	373,248	4.160
23	529	4.796	12,167	2.844	73	5,329	8.544	389,017	4.179
24	576	4.899	13,824	2.884	74	5,476	8.602	405,224	4.198
25	625	5.000	15,625	2.924	75	5,625	8.660	421,875	4.217
26	676	5.099	17,576	2.962	76	5,776	8.718	438,976	4.236
27	729	5.196	19,683	3.000	77	5,929	8.775	456,533	4.254
28	784	5.292	21,952	3.037	78	6,084	8.832	474,552	4.273
29	841	5.385	24,389	3.072	79	6,241	8.888	493,039	4.291
30	900	5.477	27,000	3.107	80	6,400	8.944	512,000	4.309
31	961	5.568	29,791	3.141	81	6,561	9.000	531,441	4.327
32	1,024	5.657	32,768	3.175	82	6,724	9.055	551,368	4.344
33	1,089	5.745	35,937	3.208	83	6,889	9.110	571,787	4.362
34	1,156	5.831	39,304	3.240	84	7,056	9.165	592,704	4.380
35	1,225	5.916	42,875	3.271	35	7,225	9.220	614,125	4.397
36	1,296	6.000	46,656	3.302	86	7,396	9.274	636,056	4.414
37	1,369	6.083	50,653	3.332	87	7,569	9.327	658,503	4.431
38	1,444	6.164	54,872	3.362	88	7,744	9.381	681,472	4.448
39	1,521	6.245	59,319	3.391	89	7,921	9.434	704,969	4.465
40	1,600	6.325	64,000	3.420	90	8,100	9.487	729,000	4.481
41	1,681	6.403	68,921	3.448	91	8,281	9.539	753,571	4.498
42	1,764	6.481	74,088	3.476	92	8,464	9.592	778,688	4.514
43	1,849	6.557	79,507	3.503	93	8,649	9.644	804,357	4.531
44	1,936	6.633	85,184	3.530	94	8,836	9.695	830,584	4.547
45	2,025	6.708	91,125	3.557	95	9,025	9.747	857,375	4.563
46	2,116	6.782	97,336	3.583	96	9,216	9.798	884,736	4.579
47	2,209	6.856	103,823	3.609	97	9,409	9.849	912,673	4.595
48	2,304	6.928	110,592	3.634	98	9,604	9.899	941,192	4.610
49	2,401	7.000	117,649	3.659	99	9,801	9.950	970,299	4.626
50	2,500	7.071	125,000	3.684	100	10,000	10.000	1,000,000	4.642

CUMULATIVE TEST 1 (Frames 1-1970)

1. Write 17(9) in another way which will show the meaning of the Commutative Principle for Multiplication.

2. Write the Commutative Principle for Addition in words and also in algebraic symbols.

3. Write the Associative Principle for Multiplication in words and also in algebraic symbols.

4. Write the Associative Principle for Addition in words and also in algebraic symbols.

5. How would you represent "a multiplied by b multiplied by c"?

6. Write in algebraic form: x less than fourteen.

7. Simplify: $20 - 6 \times 3 + 12 \div 4 =$ ____________.

8. Simplify this expression:

$$9 \div 3 + 2(4 + 6) = \underline{\hspace{3cm}}.$$

9. Write the expression for the product of 5 and bc.

10. How many terms are there in this expression? $6x + 3y - 4z - 4$

11. If x represents some number, how would you write in algebraic form "twice the number decreased by one-third the number"?

12. Bob weighs x pounds. How much does Jim weigh, if he weighs y pounds less than Bob?

13. What are the prime factors of 40?

14. What are the factors of 14b?

15. Write 7(7)(7)(7) in exponential form.

16. Does the root $(c = 20)$ check in this equation? (Write out the complete check to prove your answer).

$$\frac{3c}{4} + 17 = 32$$

17. Find the product: $5a^2b(6ab^3)$.

18. Evaluate: $(6x^2 + 7y^2)$ if $x = 3$ and $y = 4$.

19. Combine: $3x + 4y + 7x - 2y + 9x + 3y$

20. Divide: $35c/7$

In examples 21-32, solve each of the equations for the unknown:

21. $x + 6 = 17$

22. $10 = y - 9$

23. $6a = 27$

24. $c/4 = 7$

25. $\frac{1}{8}k = 2$

26. $17x + 5 = 90$

27. $18y - 10 = 8$

28. $19a + 4a - 18a = 25$

29. $\frac{x}{5} + 7\frac{1}{2} = 11\frac{1}{2}$

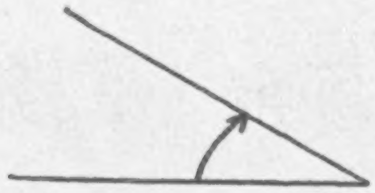
30. $5y + 2y - 7 = 9 + 5$

31. $(4/7)t = 24$

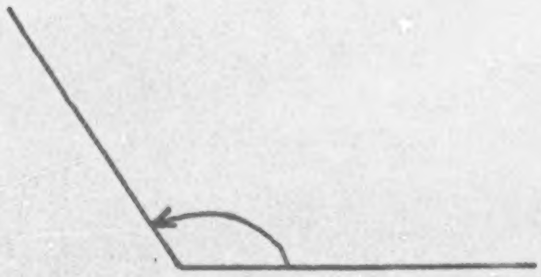
32. $(4/9)k + 12 = 20$

Identify each type of angle in examples 33-36:

33.



34.



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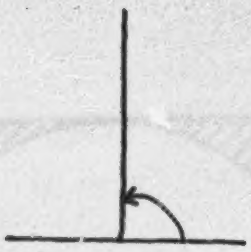
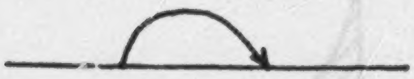


36.



37. What is the area of a rectangle whose base is 11 ft. and whose altitude is 5 ft.? (Label your answer).

38. Find the perimeter of a square 7 inches on a side. (Label your answer).

39. If the altitude of a triangle is 14 inches and the base is 9 inches, what is the area? (Label your answer).

Use this information for examples 40 and 41:

The base of a parallelogram is 8 inches, the altitude is 6 inches, and the side is 7 inches.

40. Find the area.

41. Find the perimeter.

Use the following information for examples 42 and 43:

A circle has a diameter of 16 inches.

42. Find the circumference.

43. Find the area.

44. Find the volume of a rectangular prism whose base 12 ft., width is 8 ft., and height is 3 ft.

45. What is the volume of a baseball whose diameter is 3 inches?

46. How long will it take $75 to earn $12 at 4% interest?

47. How far will an object fall in seven seconds?

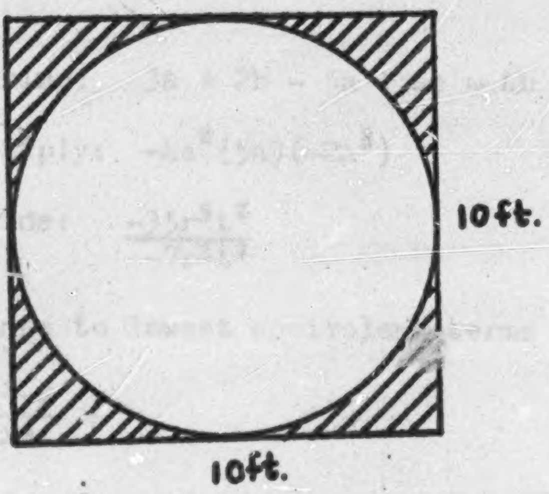
48. What is the formula represented by this table? b = ________

a	1	2	3	4	5	6
b	11	21	31	41	51	61

49. How much interest will $500 earn at 3% for 4 years?

50.

In the figure at the left, find the area of the shaded section.



CUMULATIVE TEST 2 (Frames 1971-3357)

1. Combine: $3a + 2b - 5a + 4c - 4b$

2. Multiply: $-4a^2(5a)(-2a^3)$

3. Divide: $\frac{-35r^3t^2}{-7r^2t^2}$

Change to lowest equivalent terms ex. 4-6:

4. $\frac{-8x^2yz}{-24xz}$

5. $\frac{2x}{-81x^3}$

6. $-\ \frac{-21x^2yz}{+14xy^2z^2}$

Simplify ex. 7-10:

7. $3x - [x - (3 - 2x)]$

8. $25 - [-2 + (4x - 8)]$

9. $16a + [6a - (3a - 2)]$

10. $12x + 3x(x + 5)$

11. Add:

$$\begin{array}{rrrr} -5x^3 & +3x^2 & & +5 \\ & -2x^2 & -x & -3 \\ \underline{+5x^3} & \underline{} & \underline{+x} & \underline{-10} \end{array}$$

12. Add:

$7a - 9b + c$, $5a + c$, and $3a + 8b - 2c$

13. Subtract:

$$\begin{array}{r} -3a + 9b - 6c \\ \underline{-2a - 3b + 7c} \end{array}$$

14. Subtract:

$(4x^2 - 3x + 6) - (5x^2 - 2x + 3)$

15. Arrange the terms of this polynomial in descending order of the powers of x:

$x^3 - 17xy^2 + 66y^3 - 5x^2y$

16. Multiply:

$$\begin{array}{l} x^2 - 2xy + y^2 \\ \underline{x - y} \end{array}$$

17. **Multiply:** $x^3 - 2x^2 + 3x + 1$ by $x - 2$

18. **Divide:** $\dfrac{-27a^3 + 18a^2 - 45a}{-9a}$

19. **Divide:** $a - 2b\overline{)\,a^3 - 4a^2b + 3ab^2 + 2b^3}$

20. **Divide:** $a^2 - 25$ by $a - 5$

CUMULATIVE TEST 3 (Frames 3358-4027)

Solve for the unknown and check. Show all of your work.

1. $\frac{x}{7} = 16$
2. $4x = x + 12$
3. $6c + 12 = 3c + 63$
4. $6a = 25 + a$
5. $5x + (3x + 4) = 15-(x-7)$
6. **Solve for r:** $d = rt$
7. **Solve for x:** $bx-b^2 = 2b^2 -2bx$
8. **Solve for t:** $3t-2(5t-4s) = - 8t$

Graph the following equations: Use your own graph paper and show all work.

9. $3x + y = 7$
10. $-3x + 6y = 12$

CUMULATIVE TEST 4 (Frames 4028-5283)

1. Solve this system of equations for x and y by the addition-subtraction method.
   (1) $4x + 6y = -6$
   (2) $4x + 2y = -2$

2. Solve by substitution for x and y.
   (1) $3x - y = 6$
   (2) $2x + y = 9$

3. The fourth consecutive even integer after six is__________.

4. Write the third, fifth and seventh consecutive integers after x.

5. The sum of three consecutive off integers is equal to 21. Find them.

6. How far will a bus travel in 12 hours at the rate of 50 miles per hour?

7. An automobile travels at the rate of 55 miles per hour. How long will it take to go a distance of 605 miles?

8. Two cars start at the same time and travel in opposite directions. The first averages 28 miles per hour, and the second averages 35 miles per hour. In how many hours are they 252 miles apart?

Multiply mentally (9-16):

9. $8(x - y)$

10. $\frac{1}{3}(a + 6b)$

11. $y(y - 3)$

12. $x^3(x^5 + x^4 + 1)$

13. $-3a(5a^3 - 2a^2 + a - 10)$

14. $(3c - 4d)(3c - 4d)$

15. $(2x - 5d)(2x + 5d)$

16. $(2a + 3b)(3a - 2b)$

Factor examples 17 through 27:

17. $4x^2 - 28$

18. $xy + xz$

19. $3c^2 + 9c - 27$

20. $144a^4 - 64$

21. $x^2 y^4 - 81x^2$

22. $a^2 + 15a + 36$

23. $x^2 - 16x + 63$

24. $3x^2 - 6x - 24$

25. $2x^4 z - 16x^2 y^2 z + 32y^4 z$

26. $14x^4 y - 2x^3 y - 6x^2 y + 12xy$

27. $25m^2 - 70mn + 49n^2$

28. Four times a certain number increased by 16 is 12 less than 8 times the number. What is the number?

Square examples 29 and 30:

29. $(5x^2 y)^2$

30. $(-7abc^3)^2$

Extract the square root in examples 31 and 32:

31. $\sqrt{225a^6 b^4}$

32. $\sqrt{\frac{1m^4}{16}}$

33. Plot the graphs of equations (1) and (2) on your own graph paper. What is the common solution?

(1) $x + y = -6$
(2) $x - y = -10$

CUMULATIVE TEST 5 (Frames 5284-6511)

1. Solve for x by the factoring method:
$3x^2 - 10x + 3 = 0$

2. Solve for t by the factoring method:
$t^2 = 8t$

3. Solve for n by the factoring method:
$4n^2 = 4$

4. Change to the lowest equivalent fraction:
$\frac{7x^2y^3}{35y^2z^2} =$

5. Change to the lowest equivalent fraction:
$\frac{5b^2 - 15b}{b^2 - 9}$

6. Multiply: $\frac{3x - 12}{x^2 - 8x + 15} \cdot \frac{x^2 - 12x + 35}{(x - 4)^2} \cdot \frac{x^2 - 16}{x^2 - 3x - 28}$

7. Divide: $\frac{a - 9}{5a} \quad \frac{3a - 27}{10a^3}$

8. Combine: $\frac{2x + 3}{12x} - \frac{3x - 6}{8x}$

9. Combine: $\frac{3y}{y^2 - 4} + \frac{4}{2y - 4}$

10. Solve for x: $\frac{2x + 1}{x - 1} + \frac{3x}{x + 2} = \frac{5x^2 - 4}{x^2 + x - 2}$

11. Write as a fraction: m^{-5}

12. One pipe can fill a cistern in 10 hours, and a smaller pipe can fill the cistern in 15 hours. If both pipes are used, how many hours are needed to fill the cistern?

13. A dealer has some candy worth 45¢ a pound and some worth 70¢ a pound. He wishes to make a mixture of 120 pounds that will be worth 55¢ a pound. How many pounds of each kind should be used?

14. If 15 is subtracted from a certain number, and the result is multiplied by 3, the product is 180. What is the number?

15. The square of a certain number diminished by 12 times the number is 160. What is the number?

CUMULATIVE TEST 6 (Frames 6512-7551)

Use table 199 in the supplement for examples a, 2, and 3.

1. $(49)^3 =$ ______
2. $\sqrt[3]{35} =$ ______
3. $\sqrt{91}$
4. Write the exponential form: $\sqrt[5]{b^3}$

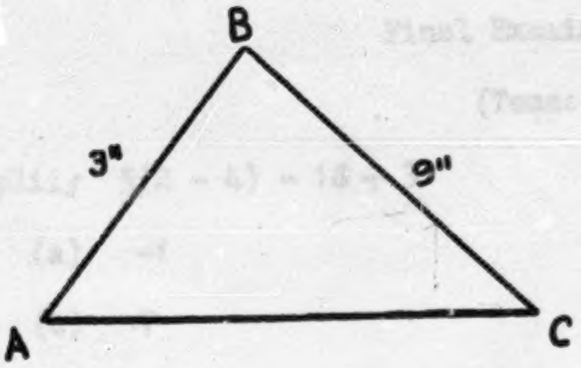
In examples 5 through 8, write in simplest radical form:

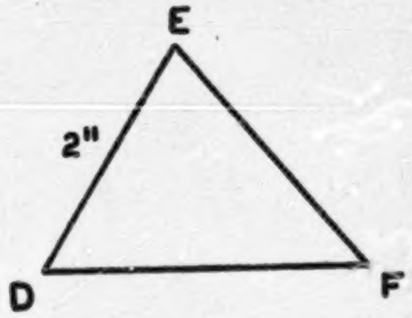
5. $\sqrt{250}$
6. $7\sqrt{72y^3}$
7. $\sqrt{5/9}$
8. $5\sqrt{5/8}$

Combine in examples 9 and 10:

9. $8\sqrt{3} - 2\sqrt{3}$
10. $\sqrt{54} - \sqrt{24} + \sqrt{96}$
11. Multiply: $(2\sqrt{7} - 3)(2\sqrt{7} + 3)$
12. Multiply: $(3\sqrt{3} + 4)^2$
13. Divide: $\frac{\sqrt{48} - \sqrt{12}}{\sqrt{3}}$
14. Solve for x: $3\ x - 2 = 10$
    $x =$ ______
15. Solve for y by completing the square:
    $y^2 - 9y + 20 = 0$ $y =$ ______
    $y =$ ______
16. Solve for x using the quadratic formula:
    $2x^2 - 5x + 2 = 0$ $x =$ ______
    $x =$ ______

17.



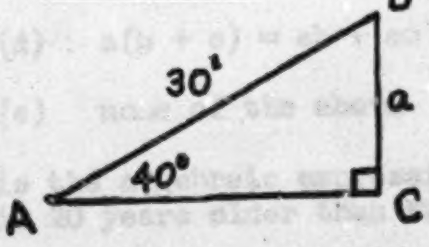


Triangle ABC is similar to triangle DEF. Find EF, using a proportion.

18. If 4 oranges cost 28¢, find the cost of 10 oranges at the same rate. Write the proportion and solve.

19. In △ ABC, ∠C = 90°, ∠A = 40°, and AB = 30', find a. Use Trigonometric Table 214 in the supplement.

a = ______



20. In a two-digit number the sum of the digits is 9. The number itself is 12 times the tens digit. Find the number.

Final Examination

(Temac)

1. Simplify $5(2 - 4) - 18 \div 3$

   (a) -1

   (b) 7

   (c) -16

   (d) $2\frac{1}{2}$

   (e) none of the above

2. Which of the following represents the Associative Principle for Addition.

   (a) $a + (b + c) = (a + b) + c$

   (b) $a + b + c = x + y + z$

   (c) $a + b + c = c + b + a$

   (d) $a(b + c) = ab + ac$

   (e) none of the above

3. What is the algebraic expression representing the following statement. John is 20 years older than Frank, if Frank is x years old, how old is John.

   (a) $20 - x$

   (b) $20x$

   (c) $x + 20$

   (d) $x - 20$

   (e) none of the above

4. The prime factors of 128 are

   (a) $8 \cdot 8 \cdot 2 \cdot 1$

   (b) $128 \cdot 1$

   (c) $64 \cdot 2 \cdot 1$

   (d) 2^7

   (e) none of the above

5. An equivalent expression for $4(xy)^3$ is

(a) $4(xy)(xy)(xy)$

(b) $4 \cdot 4 \cdot 4 \cdot xy$

(c) $4^3 x^3 y^3$

(d) $64xy$

(e) none of the above

6. Evaluate $(x + \frac{y}{z} - w)$ if $x = 10$, $y = 4$, $z = 2$, $w = 8$

(a) 6

(b) 7

(c) 8

(d) 9

(e) none of the above

7. Solve for x: $\frac{2x}{9} + 7 = 8$

(a) 6

(b) 4.5

(c) 3.6

(d) 8.2

(e) none of the above

8. Find the circumference of a circle with a radius of 4.

(a) 4π

(b) 6π

(c) 12.28

(d) 16π

(e) none of the above

9. How long will it take $120 to earn $12 at 4% interest?

(a) $2\frac{1}{2}$ years

(b) $7\frac{1}{2}$ years

(c) 6.68 years

(d) 7.2 years

(e) none of the above

10. **Divide:** $\frac{a^4 b^5 c^6}{a^2 b^7 c^4}$

(a) $a^2 b^2 c^2$

(b) $\frac{a^2 b^3}{c^2}$

(c) $\frac{a^2}{b^2 c^2}$

(d) $\frac{a^2 c^2}{b^2}$

(e) none of the above

11. **Simplify:** $12 - \left[- 8 + (-2x + 4)\right]$

(a) $2x - 16$

(b) $12 - x$

(c) $16 + 2x$

(d) $18 - 3x$

(e) none of the above

12. **Divide:** $(6x^2 + x - 15) \div (3x + 5)$

(a) $2x + 7$

(b) $-3 + 2x$

(c) $-2x + 5$

(d) $3x + 5$

(e) none of the above

13. **The point (0,0) falls in what quadrant ?**

(a) I

(b) II

(c) III

(d) IV

(e) none of the above

14. Solve for x: $3x - 2(2x + 1) = 12 - (3x + 2)$

(a) $+6$

(b) -4

(c) $+3$

(d) -2

(e) none of the above

15. **The line which has for its equation $y = (5/4)\,x + 2$ intersects the y-axis at what point.**

(a) $(5/4, 0)$

(b) $(0, 5/4)$

(c) $(0, 2)$

(d) $(2, 0)$

(e) none of the above

16. Solve for x and y :

$$\begin{aligned} 4x + 6y &= 52 \\ x - 3y &= 4 \end{aligned}$$

(a) $x = 22,\ y = -6$

(b) $x = 10,\ y = 2$

(c) $x = 6,\ y = 3$

(d) $x = -8,\ y = 2$

(e) none of the above

17. Simplify: $(3x + 1)(2x + 5) - 3x + 2(x + 1)$

(a) $6x^2 - 10x + 3$

(b) $6x^2 - 8x + 7$

(c) $6x^2 + 14x + 3$

(d) $6x^2 + 16x + 7$

(e) none of the above

18. Six times a number increased by 15 is equal to 63. What is the number?

(a) 6

(b) 8

(c) 12

(d) 6

(e) none of the above

19. Two cars leave at the same time and travel in opposite directions. The rate of the first is 36 miles an hour and the rate of the second is 44 miles an hour. In how many hours will they be 720 miles apart?

(a) 12

(b) 8

(c) $7\frac{1}{2}$

(d) 9

(e) none of the above

20. Simplify: $\sqrt{a^4 y^5 z^8}$

(a) $a^4 z^4 \sqrt{y^5}$

(b) $a^2 y^2 z^4 \sqrt{y}$

(c) $a z \sqrt{y^5}$

(d) $\sqrt{a^2 y^{5/2} z^4}$

(e) none of the above

21. Factor: $25x^3 - 64x y^2$

(a) $x(5x + 8y)(5x - 8y)$

(b) $(5x - 8y)(5x - 8y)$

(c) $x(5x - 8)(x + 8y^2)$

(d) $(5x^3 + 64y)(x + y)$

(e) none of the above

22. Change to lowest equivalent terms. $\dfrac{x^4 + 4x^3 + 4x^2}{x^2 + 2x}$

(a) $x^2(x - 2)$

(b) $(x - 2)(x + 2)$

(c) $x(x + 2)$

(d) can't be reduced any further

(e) none of the above

23. Divide: $\frac{6a^2 - 3ab}{3ab(2a - b)} \div \frac{6a^2 - 2ab}{3a^2 + 2ab - b^2}$

(a) $\frac{1}{2}$

(b) $3a - b$

(c) $\frac{3ab + 1}{2a - 1}$

(d) $a^2 - 2$

(e) none of the above

24. Multiply: $\frac{(x - 5)^2}{4y^2} \cdot \frac{16y}{x^2 - 25} \cdot \frac{x^2 + 12x + 35}{x^2 + 2x - 35}$

(a) $\frac{y - 5}{y(x - 5)}$

(b) 3

(c) $4/y$

(d) 1

(e) none of the above

25. $\frac{a}{b} + \frac{c}{d} =$

(a) $\frac{a + c}{bd}$

(b) $ad + bc$

(c) $\frac{ad + bc}{b + d}$

(d) $\frac{ad + bc}{bd}$

(e) none of the above

26. Perform the indicated operations $x + 3y + \frac{5y^2}{x - y}$

(a) $\frac{x^2 + 2xy + 2y^2}{x - y}$

(b) $\frac{x + y}{x - y}$

(c) $x^2 + 3xy + y^2$

(d) $\frac{2x - 3x^2 + xy}{x - y}$

(e) none of the above

27. Simplify: $\frac{x + y}{\frac{1}{x} + \frac{1}{y}}$

(a) $x + y$

(b) xy

(c) $\frac{1}{x + y}$

(d) $\frac{x + y}{xy}$

(e) none of the above

28. Solve for x: $\frac{3}{x - 4} - 6 = 0$

(a) -3

(b) $9/2$

(c) $+7$

(d) $+2$

(e) none of the above

29. A man prepares a mixture of two types of candy that was to sell for 50¢ per pound. How many pounds of a 40¢ type did he have to mix with a type which sold for 56¢ a pound to have 30 lbs. of the mixture?

(a) 18.75

(b) 13.6

(c) 11¼

(d) 9 2/5

(e) none of the above

30. Three pipes are connected to a tank. The largest pipe can fill the tank in 2 hours. Each of the two smaller pipes can drain the tank in 10 hours and 15 hours respectively. How long will it take to fill the tank if all three pipes are working together?

(a) 3 hr.

(b) 4 hr.

(c) 7 hr.

(d) 15 hr.

(e) none of the above

31. Multiply: $\sqrt{32x^2} \cdot 2xy\sqrt{y}$

(a) $2x^2\sqrt{y^3}$

(b) $2xy\sqrt{8y}$

(c) $4x^2y\sqrt{y}$

(d) $8x^2y\sqrt{2y}$

(e) none of the above

32. Rationalize the denominator and simplify. $\frac{\sqrt{5}}{2\sqrt{3}+\sqrt{5}}$

(a) $\frac{6-\sqrt{2}}{2}$

(b) $\frac{2\sqrt{15}-5}{7}$

(c) $\sqrt{5}+2\sqrt{6}$

(d) $\frac{\sqrt{10}+4}{\sqrt{2}}$

(e) none of the above

33. Combine: $6\sqrt{1/3} + \sqrt{1/6} - \sqrt{48}$

(a) $6\sqrt{6} + (1/3)\sqrt{2}$

(b) $(1/6)\sqrt{6} + 4\sqrt{2}$

(c) $(1/6)\sqrt{6} - 2\sqrt{3}$

(d) $6\sqrt{6} - 5\sqrt{3}$

(e) none of the above

34. Solve for x: $\sqrt{7x + 15} - 6 = 2$

(a) $x = -7$

(b) $x = +9$

(c) $x = +6$

(d) $x = +7$

(e) none of the above

35. The general form of the quadratic equation is

(a) $ax^2 + bx + c = 0$

(b) $x = \frac{-b}{a} \pm \sqrt{b^2 - 4ac}$

(c) $\pm\sqrt{b^2 - 4ac}$

(d) $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

(e) none of the above

36. Solve for x: $2x^2 = 12 - 5x$

(a) $1 \pm \sqrt{7}$

(b) $-2 \pm \sqrt{6}$

(c) $-2.5, 1.6$

(d) $-4, -3/2$

(e) none of the above

37. The sum of the digits of a two digit number is 13. The difference of the digits is equal to 1 and the tens digit is larger than the unit digit. Find the number.

(a) 76

(b) 85

(c) 67

(d) 58

(e) none of the above

38. The graphs of the equations $x + 3y = 9$ and $2x - y = 4$ intersect at the point

(a) (6,1)

(b) (3,2)

(c) (4,3)

(d) 8,-2)

(e) none of the above

39. Two triangles are similar, the sides of a smaller triangle are 4, 5, and 6 in. If the shortest side of a larger triangle is 12 in., what is the length in inches of the longest side?

(a) 22

(b) 26

(c) 20

(d) 18

(e) none of the above

40. The perimeter of a rectangle is equal to 48 inches. What is the length of the diagonal if one side is 2 in. greater than the other?

(a) 12.62

(b) $2\sqrt{70}$

(c) $3\sqrt{34}$

(d) 13.48

(e) none of the above

UNIT TEST ANSWERS

Unit Test 1

1. +; -
2. dividend
   divisor
   quotient
3. 200
4. multiply
5. 8(5)(3)
6. remainder or difference
   minuend
   subtrahend
7. c, d, f; As few parentheses as possible are used in order to make the example less complicated.
8. (a) $4(6wy)$
   (b) $10xy$
   (c) $15ab$
9. (a) division
10. 17
11. 13
12. c
13. a, b, c
14. A, l, w
15. $d + 7$
16. $b + c$
17. $m + n + 12p$
18. $15 + s$
19. $2d + 5c$
20. $4t$, x
21. 3
22. -7
23. $14 - a$
24. $10 - y$
25. $a - b$
26. 4(3) or 3(4)
27. $3t$
28. bc
29. $5(7xy)$
30. $8x + 4$
31. $4a - 5$
32. $\frac{c}{3} + 9$
33. $(59 + p)$ in.
34. $(y - 6)$ lb.
35. $(10 - x)$ dollars
36. $5x$ cents
37. $\frac{80}{q}$ cents
38. $(120 - m)$ lb.
39. $(140 + b)$ lbs.
40. $(42 - x)$ yrs.
41. $(c + 11)$ yrs.
42. $(w + z)$ lb.
43. $(b - y)$ lbs.

Unit Test 2

1. 16
2. 50
3. 10
4. 37
5. 9
6. 1
7. 14
8. 30
9. 5
10. prime
11. 2(3)(5)
12. numerical
13. literal
14. yes
15. base
    exponent
16. 2^4
17. $6y^2$
18. 1000
19. 1
20. r s r s r s

    or

    r r r s s s
21. Commutative
22. Commutative
    (y + x)
23. yes
24. $4x^8$
25. Associative
26. $24a^7b^5c$
27. 3
28. $-x^2y$
29. x
30. 16y
31. 11
32. 3
33. 4
34. 26
35. 10
36. 5
37. 29
38. 5
39. 72

Unit Test 3

1. 8b
2. 60
3. 7
4. 28
5. 32
6. 8
7. 10 2/5
8. check
9. 0
10. 35
11. 28 = n

12. b = 31 1/3
13. 15n = 60
14. x/6 = 12½
15. n + 25 = 81
16. J + 9 = 20
17. d - 9 = 6
18. P/3 = 97
19. x = 6
20. v = 5
21. x = 14
22. y = 20
23. x = 9
24. x = 24
25. 4
26. check
27. 1/9
28. 4/3
29. 52
30. check
31. x = 18

Unit Test 4

1. 31 inches
2. 21 inches
3. 24 inches
4. 20 inches
5. 42 inches
6. p = 2b + 2s
7. 18 inches
8. 80 square feet
9. 5 feet
10. $132
11. 52 square feet
12. 36 square feet
13. 60 square inches
14. 16 inches
15. 104 square inches
16. diameter
17. radius
18. 3 1/2 inches
19. 21.98 inches
20. 18.84 inches
21. 200.96 sq. in.
22. 314 sq. ft.
23. 1430 miles
24. 230 m.p.h.
25. 180 cu. in.
26. 3 inches
27. 113.04 cu. in.
28. $52
29. 6 years
30. 1600 feet
31. ½ ampere
32. y = 4x + 1

Unit Test 5

1. -3 dollars
2. +35 miles
3. +14
4. -350 miles
5. +17
6. -25
7. 15
8. +13
9. -9
10. +28
11. +9
12. -21
13. 0
14. +7
15. +31
16. -24
17. +18
18. -32
19. +30
20. +175
21. +4
22. -4
23. -5
24. +8
25. -2
26. -10
27. +12
28. 0
29. $2x$
30. $-3a$
31. $6y$
32. $9b$
33. $4a + 3b - 2c + 6d + 7e$
34. $7a - b + 2$
35. $4x^3 - 3x - 6x^2y + 7xy^2 - 9y^3$
36. $3x^2 + 6x - 2$
37. $-4a^3 - a^2 + 9a - 7$
38. $+12a$
39. 0
40. $-18x^7$
41. $70x^6$
42. $81x^6$
43. $-27x^6$
44. $c^3 d^6 e^{15}$
45. $-8x^6$
46. $+10x^2$
47. +2
48. $-5abc$
49. $-8xy$
50. 1

Unit Test 6

1. $\frac{1}{2}$
2. $-3/7$
3. y^3
4. $12x^3$
5. $1/abc$
6. $-1/2xy$
7. $7a^2$
8. $-5c^2/a^2$
9. $-2/x^2$
10. 2
11. No
12. Yes
13. No
14. No
15. Yes
16. Yes
17. $x^2 + 7xy - y^2$
18. $2a + 2b + 16c$
19. $-3a^2 + 21ab - 3b^2$
20. $30x^4 + 25$
21. $-2x^2 + 2xy - 2xz$
22. $x^2y^2 + x^3y^3 - x^4y^4$
23. $-2a^3b + 2ab^3 - 4a^2b^2$
24. 17
25. -1
26. 5
27. -1
28. $-12x^2 + 6$
29. $10 - 5b$
30. $-3a + 7b$
31. $3x^3 - 5x^2 + 2x - 8$
32. $9x - 6y - 6z$
33. $3x - 6$
34. $11x$
35. $19x - 3y$
36. $5a + 2$
37. $-c + 2d$
38. $23a - 24b$
39. $20 - 5x$
40. $6x + 6$

Unit Test 7

1. $+4$
2. $+ 9b$
3. $+7cd$
4. $-7f$
5. $4x^2 - 3y^2$
6. $4x^2 - 3x$
7. $3x + 5y$
8. $d + f$
9. $6z^2 - 8z + 16$
10. $a^8 - 6a^6 + 3a^4 - 9a^2 + 12$
11. $z^2 + 15z + 56$
12. $a^2 - 9a + 14$
13. $15x^2 + 29x +12$

14. $20b^2 - 9bc - 81c^2$

15. $h^2 + h - 12$

16. $(c^2 + 13c + 36)$ sq. ft.

17. $(x^2 + 6x - 91)$ miles

18. 9

19. -12

20. 9

21. -7

22. $-b^2$

23. +1

24. $1/x^9 = x^{-9}$

25. $6c^4d$

26. $11x^2/y$

27. $4 + 8a^3$

28. $y + 2$

29. $5b + 2$

30. $x^2 - 2x + 6$

31. $9c - 18$ (81 remainder)

32. $6w^2 - 22w + 73$ (-237 remainder)

Unit Test 8

1. exponent
2. 12
3. 1
4. first
5. $y = 216$
6. $y = 12$
7. $n = 21$
8. $x = 7$
9. $x = 10$
10. $8y + 5y + 48$
    $8(16) = 5(16) + 48$
    $128 = 80 + 48$
    $128 = 128$
    Check
11. $c = \frac{1}{4}$
12. $b = 4$
13. $x = -13/4$
14. $t = -15$
15. $x = 12$
16. $x = 13\ 3/4$
17. $m = -3$
18. $a = 17$
19. $y = 6\ 3/4$
20. $s = 2$
21. 7/10
22. m/8
23. c/d
24. 16/x
25. b/c
26. $x = 5a$
27. $x = 3n + 17$
28. $y = bd$
29. $x = a$
30. $x = -8m$
31. 4

32. $\frac{4}{3} r^3$

33. $R = \frac{E}{I}$

Unit Test 9

1. bar
2. 6
3. 20
4. broken-line
5. 20°
6. 8 a.m.
7. straight-line
8. 250 miles
9. 7 hours
10. x
11. y
12. (4, -6)
13. (0, -5)
14. (-4, 4)
15. - 18. Answers omitted because of their simplicity.
19. IV
20. II
21. I
22. III
23. (0, 0)
24. none
25. y = 3, 7, 9
26. graph
27. No
28. linear
29. first
30. straight
31. slope
32. y-intercept
33. graph
34. -2 (Answer correct read between -2 and - 3)
35. (a) Solve for x and then substitute values for x to determine y.

    (b) y-intercept and slope method

Unit Test 10

1. simultaneous
2. $y = 2\frac{1}{2}$
3. $y = 1$
4. $y = 0$
5. $x + y$
6. $x = 9$; $y = 3$
7. $a = -10$; $b = +1$
8. $m = 3$
9. $x = 9$
10. $x = 5$
11. $x = -2$; $y = 4$
12. $x = -1$; $y = -1$
13. $c = 7$; $d = -2$

Unit Test 11

1. 36 and 6
2. 48 and 16
3. 3
4. 5, 25, and 100
5. 27, 28, and 29
6. 61 and 63
7. $40h + 36h = 532$
   7 hours
8. $6x + 6(x + 10) = 480$
   Train A - 45 m.p.h.;
   Train B - 35 m.p.h.

Unit Test 12

1. $2m^3 + 8m$
2. $-4a^3 + 3a^2b - 4ab^2$
3. $6(x - y)$
4. $a(a + 4)$
5. $x(7x^3 + x^2 - x - 42)$
6. $5k(k^2 + k - 12)$
7. $3y(y^4 - 2y^3z - 3z^5)$
8. $9a^2b^2(3b - 2a + 1)$
9. b^{12}
10. $64x^9$
11. $121a^4b^4$
12. 1
13. 6
14. x^4
15. xy^3z^3
16. $8x^2y^4$
17. $x^2 - 49$
18. $16x^2 - 49y^2$
19. $49x^8 - 4y^8$
20. $a^4 - 16$
21. $16x^4 - 81y^4$
22. $(8 + 5x)(8 - 5x)$
23. $(12x^3 + 7y^4)(12x^3 - 7y^4)$
24. $(a + 1)(a - 1)$
25. $(x^2 + 4b^2)(x + 2b)(x - 2b)$
26. $(cd + ab)(cd - ab)$
27. $(1 + xyz)(1 - xyz)$
28. $5(2x + 3y)(2x - 3y)$
29. $4(x + 5)(x - 5)$
30. $y(y + 4)(y - 4)$
31. $9x(x + 3y)(x - 3y)$
32. $k^2 - 15k + 50$
33. $a^2 + 4a - 12$
34. $6y^2 - 2y - 20$
35. $6a^2 + ab - 15b^2$
36. $20 - 38x + 14x^2$

Unit Test 13

1. $(x + 1)(x + 1)$
   or $(x + 1)^2$
2. $(x + 4)(x + 1)$
3. $(x + 9)(x + 1)$
4. $(x + 7)(x + 2)$

5. $(x + 5)(x + 3)$

6. $(x - 6)(x - 1)$

7. $(x - 7)(x - 3)$

8. $(a - 8)(a - 3)$

9. $(y - 9)(y - 6)$

10. $(b - 11)(b - 11)$

11. $(c - 5)(c + 2)$

12. $(x - 2)(x + 1)$

13. $(x + 8)(x - 3)$

14. $(a - 8)(a + 6)$

15. $(x + 9)(x - 4)$

16. $(2x + 3)(2x + 3)$
or $(2x + 3)^2$

17. $3(x + 1)(2x + 3)$

18. $4(x + 1)(x + 1)$
or $4(x + 1)^2$

19. $(3x - 2)(3x - 2)$
or $(3x - 2)^2$

20. $9(x - 1)(x - 1)$
or $9(x - 1)^2$

21. $2a(x - 4)(x - 1)$

22. $7(2x + 1)(x - 2)$

23. $2(5a - 7)(a + 1)$

24. $9(x - 2y)(x + 2y)$

25. No

Unit Test 14

1. 42

2. 15

3. 0

4. -7

5. $c = 4$ or $c = -1$

6. $m = 0$, $m = -8$

7. $b^2 - 9b + 8 = 0$

8. $n = 8$; $n = 3$

9. $r = -3$; $r = 5/2$

10. $c = 7/6$; $c = -7/6$

11. $x - 9$

12. $n + 1$

13. 53, 55, 57

14. $5(y + 12)$ or $5y + 60$

15. $7(x - 6)$ or $7x - 42$

16. No

17. -7 or $+3$

18. 5 or 3

Unit Test 15

1. $\frac{18x^2}{6xy}$

2. $\frac{7c}{8}$

3. $\frac{4x^3}{5y}$

4. x^3

5. $\frac{xy}{2}$

6. $\frac{1}{4}$

7. 1

8. $8x$

9. $\frac{x - 8}{2x}$

10. $\frac{4}{a + 6}$

11. $\frac{7(a + b)}{14a}$

12. $\frac{a + b}{2a}$

13. $\frac{2a + 3}{2a - 3}$

14. $\frac{a + 2}{a + 3}$

15. $7x$

16. $\frac{2a}{3b}$

17. 4

18. $\frac{1}{a + b}$

19. $\frac{ac}{b^2d}$

20. 3

21. $\frac{14}{15}$

22. $\frac{3}{8x}$

23. 14

24. 30

25. $16a$

26. $a^2 - 25$

27. 25

28. $60x$

29. $3ay$

30. 12

31. 22

32. $10(a + 2b)$

33. $\frac{3a - 186b}{40(a - 2b)(a + 2b)}$

34. $\frac{8(a + 4)}{6(a - 2)(a + 2)}$

Unit Test 16

1. x^7
2. x^0 or 1
3. $1/x^2 = x^{-2}$
4. $1/x^2$
5. b/a^3
6. c^2/d^3
7. $\frac{2(11a - 18)}{15}$
8. $\frac{a - 4}{(a + 2)(a - 2)}$
9. decreases
10. increases
11. b increases
12. y increases
13. $f = 28$
14. $h = 35$
15. $k = 12$
16. $g = 5$
17. $q = 14$
18. $z = -61$
19. $p = 8$
20. $x = 6$
21. $r = -6$

Unit Test 17

1. 56
2. 8 and 72
3. 20, 28
4. x = 24 pounds
   40 - x = 16 pounds
5. 9 1/11 pounds
6. 2 hours
7. 2 hours

Unit Test 18

1. 2
2. No
3. Yes
4. Yes
5. Yes
6. 3
7. radical
8. $8\sqrt{2}$
9. $63\sqrt{5}$
10. 41.2
11. $7rs^{2}$
12. $x\sqrt{xy}$
13. $8\sqrt{2x}$
14. $-9\sqrt{2}$
15. $x^{2}y\sqrt[3]{x}$
16. $-4t\sqrt{3at}$
17. $2\sqrt{2}$
18. $\frac{1}{6}\sqrt{14}$
19. $\frac{1}{6}\sqrt{6x}$
20. $\frac{1}{5x}\sqrt{3m}$
21. $7\sqrt{2}$
22. $20x\sqrt{5}$
23. $5\sqrt{6}$
24. $2\sqrt{2}$
25. $10\sqrt{3}$
26. 16
27. 2
28. $73 - 40\sqrt{3}$
29. $\frac{6(\sqrt{2} + 1)}{4}$
30. $3\sqrt{2} - 4$
31. $\sqrt{5}$
32. 6
33. $\frac{3\sqrt{y}}{x}$
34. 19
35. 4
36. 10
37. x^{2}
38. $x^{\frac{5}{2}}y^{\frac{7}{2}}$
39. $\sqrt{x^{11}}$
40. $\sqrt{m^{4}n^{4}}$

Unit Test 19

1. $ax^2 + bx + c = 0$
2. $x^2 - 5x + 16 = 0$
3. 25/4
4. 12x
5. 64
6. 3x
7. 1/16
8. 49/4
9. $x = 8, -3$
10. $a = 1, -3$
11. $x = 8, -2$
12. $y = 3/4, -2/3$
13. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
14. $x = -1, x = 11$
15. $x = 2, x = -1/3$
16. $x = \dfrac{-2 + \sqrt{5}}{3}$; $x = \dfrac{-2 - \sqrt{5}}{3}$

Unit Test 20

1. $\frac{6}{24}$ or $\frac{1}{4}$
2. $\frac{5}{8}$
3. Yes, since ratios are equal.
4. Means y and 7; Extremes x and 8
5. x and s
6. 3 and 4
7. $y = 1$
8. $x = 81$
9. 30 gal.
10. 36 feet
11. 54 lb.
12. 3 ft., 5 ft.
13. hundreds
14. tens
15. units
16. $10t + u$
17. $tu = 19$
18. $t + u = 17$
19. $10t + u = 13t$
20. $u = 2t + 7$ or $u - 2t = 7$
21. 9
22. 72
23. $6n + 5n + 30n = 82$
    12 pennies, 2 nickels, 6 dimes
24. 27 dimes; 21 nickels
25. 25 4-cent; 75 5-cent

Unit Test 21

1. variables
2. constant
3. directly
4. directly
5. inversely
6. $y = k/x$
7. direct

8. inverse

9. 32

10. ft. and in.

11. indirect

12. 3.79

13. 3

14. 1.2 ft.

15. $\angle a$; $\angle N$; $\angle NMO$; $\angle ONM$

16. rotation

17. 180

18. more than 90

19. less than 90

20. 90

21. right $\angle$

22. obtuse $\angle$

23. acute $\angle$

24. straight $\angle$

25. 55°

26. 120°

27. vertical

28. supplementary

29. $\angle e + \angle c = 180°$
$\angle f + \angle c = 180°$
$\angle e + \angle c = \angle f + \_ c$
$\angle e = \angle f$

30. $\angle d = 35°$
$\angle e = 145°$
$\angle f = 145°$

31. complementary $\angle = 21°$
required $\angle = 69°$

32. Supplementary $\angle = 22\frac{1}{2}°$
Required $= 157\frac{1}{2}°$

Unit Test 22

1. c

2. 180°

3. 90°

4. the square of the hypotenuse is equal to the sum of the squares of both legs.

5. acute

6. $\sqrt{97}$

7. 13

8. $6\sqrt{2}$

9. 2

10. 2

11. 82 ft.

12. 202.5 ft.

13. 30°

14. 51,774 ft.

15. 26.5

16. 233.3 ft.

17. 160 ft.

18. 16.58

CUMULATIVE TEST ANSWERS

Cumulative Test I

1. 9(17)

2. The Commutative Principle for Addition states that the addends may be arranged in any order without changing the value of the sum.

   $x + y = y + x$

3. The Associative Principle for Multiplication states that factors of a product may be grouped in any possible way without changing the value of the product.

   $a(bc) = (ab)c$

4. The Associative Principle for Addition states that the addends of a sum may be grouped in any possible way without changing the value of the sum.

   $a + (b + c) = (a + b) + c$

5. abc

6. $14 - x$

7. 5

8. 23

9. 5bc

10. 4 terms

11. $2x - x/3$

12. $x - y$ lb.

13. 2(2)(2)(5)

14. 14 and b, or (2)(7)(b), or 2(7b), or 7(2b)

15. 7^4

16. Yes

17. $30a^3b^4$

18. 166

19. $19x + 5y$

20. 5c

21. $x = 11$

22. $19 = y$

23. $n = 4\frac{1}{2}$

24. $c = 28$

25. $k = 16$

26. $x = 5$

27. $y = 1$

28. $a = 5$

29. $x = 20$

30. $y = 3$

31. $t = 42$

32. $k = 18$

33. acute

34. obtuse

35. right

36. straight

37. A = 55 sq. ft.

38. P = 28 inches

39. A = 63 sq. in.

40. A = 48 sq. in.

41. P = 30 inches

42. c = 50.24 inches

43. A = 200.96 sq. in.

44. V = 288 cu. ft.

45. V = 14.13 cu. ft.

46. Time = 4 yr.

47. 784 feet

48. $b = 10a + 1$

49. i = \$60

50. Area = 21.5 sq. in.

Cumulative Test II

1. $-2a - 2b + 4c$
2. $40a^6$
3. $5r$
4. $xy/3$
5. $1/-9x^2$
6. $3x/2yz$
7. 3
8. $-4x + 35$
9. $19a + 2$
10. $15x^2 + 15x$
11. $x^2 - 8$
12. $15a - b$
13. $-a + 12b - 13c$
14. $-x^2 - x + 3$
15. $x^3 - 5x^2y - 17xy^2 + 66y^3$
16. $x^3 - 3x^2y + 3xy^2 - y^3$
17. $x^4 - 4x^3 + 7x^2 - 5x - 2$
18. $3a^2 - 2a + 5$
19. $a^2 - 2ab - b^2$
20. $a + 5$

Cumulative Test III

1. $x = 112$
2. $x = 4$
3. $c = 17$
4. $a = 5$
5. $x = 2$
6. $r = d/t$
7. $x = b$
8. $t = -8s$
9. graph
10. graph

Cumulative Test IV

1. $x = 0$, $y = -1$
2. $x = 3$, $y = 3$
3. 14
4. $x + 3$, $x + 5$, $x + 7$
5. 5, 7, 9
6. d = 600 mi.
7. t = 11 hrs.
8. t = 4 hrs.
9. $8x - 8y$
10. $(1/3)a + 2b$
11. $y^2 - 3y$
12. $x^8 + x^7 + x^3$
13. $-15a^4 + 6a^3 - 3a^2 + 30a$

14. $9c^2 - 24cd + 16d^2$

15. $4x^2 - 25d^2$

16. $6a^2 + 5ab - 6b^2$

17. $4(x^2 - 7)$

18. $x(y + z)$

19. $3(c^2 + 3c - 9)$

20. $16(3a^2 - 2)(3a^2 + 2)$

21. $x^2(y - 3)(y + 3)(y^2 + 9)$

22. $(a + 12)(a + 3)$

23. $(x - 7)(x - 9)$

24. $3(x - 4)(x + 2)$

25. $2z(x - 2y)^2(x + 2y)^2$

26. $2xy(7x^3 - x^2 - 3x + 6)$

27. $(5m - 7n)^2$

28. 7

29. $25x^4y^2$

30. $+49a^2b^2c^6$

31. $15a^3b^2$

32. $m^2/4$

33. $(-8, +2)$

Cumulative Test V

1. $x = 3$, $x = 1/3$

2. $t = 0$, $t = 8$

3. $n = +1$, $n = -1$

4. $\frac{x^2y}{5z^2}$

5. $\frac{5b}{b + 3}$

6. $\frac{3}{x - 3}$

7. $\frac{2a^2}{3}$

8. $\frac{-5x + 24}{24x}$

9. $\frac{5y + 4}{y^2 - 4}$

10. $x = -3$

11. $1/m^5$

12. 6 hours

13. 72 lb. @ 45¢
48 lb. @ 70¢

14. 75

15. 20 or -8

Cumulative Test VI

1. 117,649

2. 3.271

3. 9.539

4. $b^{\frac{3}{5}}$

5. 5 10

6. $42y\sqrt{2y}$

7. $\sqrt{\frac{5}{3}}$ or $\frac{1}{3}\sqrt{5}$

8. $\frac{5\sqrt{10}}{4}$ or $\frac{5}{4}\sqrt{10}$

9. $6\sqrt{3}$

10. $5\sqrt{6}$

11. 19

12. $43 + 24\sqrt{3}$

13. 2

14. $x = 16$

15. $y = 5, y = 4$

16. $x = 2, x = \frac{1}{2}$

17. $EF = 6''$

18. $x = \$.70$ or $x = 70$ cents

19. $a = 19.284$

20. $n = 36$

FINAL EXAMINATION ANSWERS

1. c
2. a
3. c
4. d
5. a
6. e
7. b
8. e
9. a
10. d
11. c
12. b
13. e
14. a
15. c
16. b
17. d
18. b
19. d
20. b
21. a
22. c
23. e
24. c
25. d
26. a
27. b
28. b
29. c
30. a
31. d
32. b
33. c
34. d
35. a
36. e
37. a
38. b
39. d
40. e